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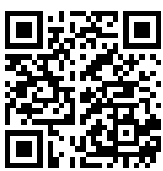

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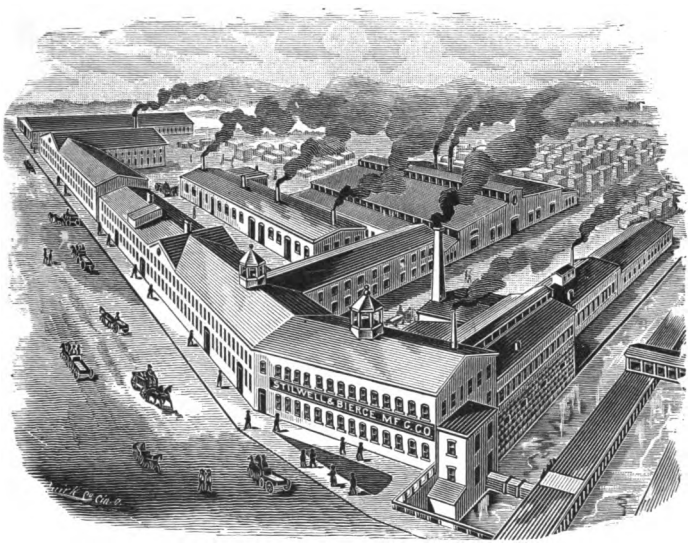
Descriptive Catalogue of

The "VICTOR" TURBINE

CATALOGUE No. 23



BIRD'S-EYE VIEW OF OUR "WEST SHOPS"

ESTABLISHED 1866

MANUFACTURED ONLY BY THE

The STILWELL-BIERCE & SMITH-VAILE CO.

DAYTON, OHIO, U. S. A.

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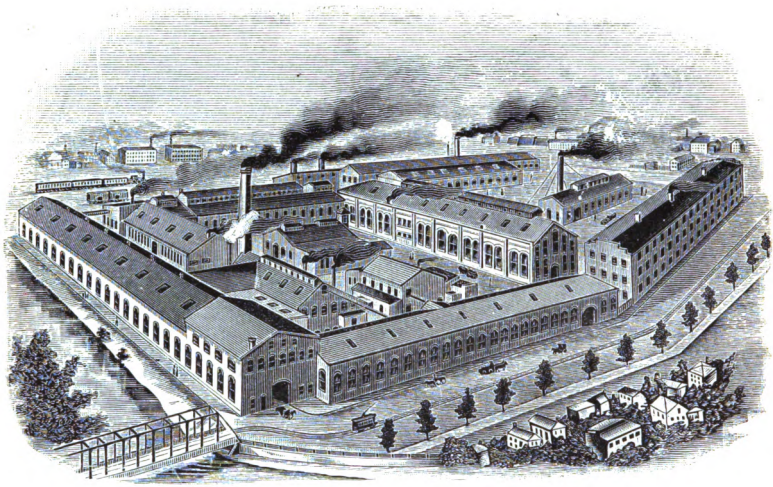

BIRD'S-EYE VIEW OF OUR "EAST SHOPS"

Copyright, 1900,
By The Stilwell-Bierce & Smith-Vaile Co.

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SPECIAL NOTICE.

WE have recently made some very valuable improvements in the details of construction of our celebrated Victor Turbine, which will add to its enviable reputation already so well established in all parts of the civilized world. These improvements have greatly strengthened the wheel, rendering it more durable under the severe shocks and strains incident to modern practice in the use of water power, and, in connection with its enormous power, high speed and efficiency, and perfect working gate, constitute a combination of excellencies not found in any other, and warrant us in claiming the Victor to be

THE BEST TURBINE IN THE WORLD.

An examination of this Catalogue will indicate something of the wide range of work we are doing in this line, but we build numerous special designs not illustrated herein. We make a specialty of complete Water Power Plants for all purposes, and are prepared to send competent engineers to examine water powers and make plans for their improvement if desired, upon equitable terms.

For some years we have been experimenting on wheels especially designed for use under high heads and these experiments have been crowned with success. We have perfected and are now prepared to furnish

THE VICTOR HIGH-PRESSURE TURBINE

which is illustrated elsewhere in this Catalogue. This is proving to be an ideal wheel under high heads, and we invite the most searching investigation of its merits.

With this new type of wheel added to our already very extensive line of water wheel patterns, we are now prepared to meet almost any demand for water wheels. In writing for further information, please state as clearly as possible your conditions and requirements, and address

THE STILWELL-BIERCE & SMITH-VAILE CO.,

DAYTON, OHIO, U. S. A.

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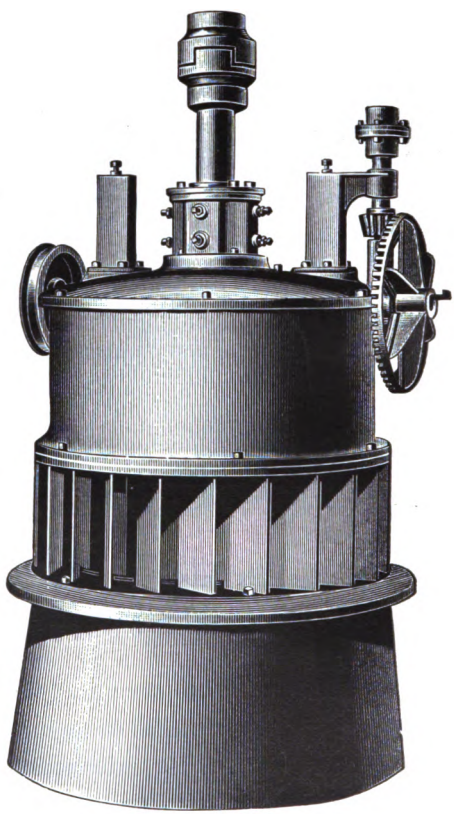
NOTE.

The cut on this page shows a counter-balance sheave on the pinion shaft for operating the gate. This sheave we furnish on all wheels larger than 27 inches, **but do not furnish the counter-balance weights, extra sheaves or chain unless specially ordered.**

If there is a governor on the wheel it is quite important to have the gate counter-balanced for close regulation, and on the larger sizes for an easy-operating gate.



THE IMPROVED "CYLINDER GATE" VICTOR TURBINE.

Regular Upright Pattern.

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IN THE construction of the Victor we have reduced the various parts of a portable Wheel and Case to the smallest possible number compatible with the greatest efficiency. Every separate piece of our Wheel and Case is fitted up to a standard guage with the greatest care—the labor being performed with the most improved machinery.

We invite the most careful comparison of our Victor Wheel, in all respects, with any and all other Turbines in the market; and, without wishing to boast, we challenge competition from any source in respect to **power, speed, simplicity, durability, strength and accessibility of all its parts.**

POWER OF THE VICTOR.

We invite particular attention to the **extraordinary power** developed by the Victor Wheel in proportion to its diameter, being from two to three times greater than that of many other Turbines hitherto regarded as first-class Wheels—a fact so startling as to be almost incredible at first to many of our correspondents. This feature is of great practical importance in the application of a Wheel to the propulsion of machinery, as it carries with it numerous advantages, among which we may name economy of space, quick speed (**a matter of special importance under low falls**), light gearing, less wear and tear and loss in transmitting power. It also secures greater accuracy of construction, with better finish and proportional strength of each part.

This feature of **great capacity in a small diameter** of Wheel, combined with its high speed, particularly adapts the "Victor" for driving electric or other rapid-running machinery, and for shipment over long and expensive routes, as its weight per horse power is much less than Wheels of ordinary construction.

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"THE VICTOR"

IS THE BEST WATER WHEEL IN THE WORLD.

IF THE printed claims of all the manufacturers of Turbines which appear in their respective catalogues, are to be believed, then there are no second or third rate Wheels on the market, and each one is "the best." This fact confuses the mind of the unsuspecting purchaser who takes these "claims" at par, and he thereby permits a low-grade Wheel to be imposed upon him. Happily for purchasers of Turbines, the means are at hand for effectually guarding them against imposition so far as power and efficiency are concerned. Every Turbine of any considerable reputation manufactured in this country, has been tested in

THE HOLYOKE TESTING FLUME,

and the official reports of the results obtained can be shown by the manufacturer of the Wheel if desired, and careful and discriminating purchasers will insist upon seeing a report of these tests before placing an order. While high economy in use of water is important it will not compensate for serious defects in other respects, such for instance, as a "trappy" or bad working gate.

The Holyoke Testing Fume is owned and operated by the Holyoke Water Power Co., Holyoke, Massachusetts, for the express purpose of affording reliable evidence of the efficiency of the various Turbines competing for business. It is provided with every means necessary for accurate work; is open to everybody on precisely the same terms and conditions; all its tests are conducted by its own engineers, and its certified reports of tests are received with confidence all over the world. A great many of our Victor Turbines have been tested at this testing flume during the past years, and these results have placed our Wheel at the very front, and have given us a record in this line of which we are justly proud.

Official reports of these tests, full and complete are on file at our office, and will be exhibited to interested parties on application.

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ON the following pages we present Tables, giving the Power, Speed and Water Consumption of the **Improved Cylinder Gate Victor Turbine,** under heads ranging from 3 to 50 feet; also similar Tables for small "Register Gate" Victor Turbines, under heads of 3 to 100 feet.

WARNING.

We guarantee these tables to be substantially correct. It is with regret that we find it necessary to warn our readers that it is the practice of many water wheel manufacturers to table their Wheels at a higher percentage of power than they actually give. For instance, some wheels are tabled at 80, 85, and even 90 per cent., when the actual power of their Wheel would not exceed 70 per cent. useful effect, or even less than that. The VICTOR is tabled to produce results which we know by repeated tests to be safe and below the actual performance of the Wheel.

By the following rule the percentage at which any Wheel is tabled can be determined.

RULE.

Multiply the cubic feet of water by 62½, which is the weight of one cubic foot of water, and multiply that product by the **head,** which will give the foot pounds; divide that by 33,000, which gives the **full horse-power of the water;** divide the horse-power they **claim** by the **full horse power** of the water, and the result will show the percentage at which their Wheels are tabled.

We also invite particular attention to the fact that we are now prepared to build Wheels of **Our New High Pressure Type for High Falls** which we can adapt in power and speed to the requirements of the situation.

We have discontinued the manufacture of the "Register Gate" Victor except to order, but all our patterns for that style are retained, so we can furnish repairs or new Wheels to order.

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Table for Improved "Cylinder Gate" Victor Turbines Under Heads of 3 to 12 Feet

Diameter of Wheel in In.	Horse Power, Cupic Feet Discharged, Revolutions per Minute.	HEAD IN FEET.									
		3	4	5	6	7	8	9	10	11	12
15	Horse Power	2.39	3.69	5.16	6.79	8.55	10.45	12.47	14.61	16.86	19.20
	Cubic Feet	527	610	682	748	808	864	917	966	1014	1058
	Revolutions	162	188	210	229	248	265	281	297	311	325
18	Horse Power	3.44	5.31	7.43	9.64	12.31	15.04	17.95	21.03	24.27	27.64
	Cubic Feet	758	878	983	1063	1163	1244	1320	1391	1460	1524
	Revolutions	136	157	176	192	209	222	235	248	260	272
21	Horse Power		7.23	10.11	13.13	16.75	20.48	24.45	28.63	33.04	37.63
	Cubic Feet		1196	1338	1448	1583	1694	1798	1895	1987	2075
	Revolutions		134	149	165	178	190	201	212	223	233
24	Horse Power			13.20	17.50	21.88	26.75	31.93	37.40	43.16	49.15
	Cubic Feet			1747	1930	2068	2212	2347	2475	2596	2711
	Revolutions			130	143	154	166	176	185	194	206
27	Horse Power			16.71	21.70	27.70	33.85	40.41	47.33	54.62	62.20
	Cubic Feet			2211	2393	2618	2800	2971	3132	3286	3430
	Revolutions			116	127	137	147	156	165	172	180
30	Horse Power			20.64	26.80	34.20	41.80	49.90	58.44	67.44	76.80
	Cubic Feet			2731	2955	3233	3457	3669	3867	4057	4235
	Revolutions			104	115	124	133	140	148	156	162
33	Horse Power			24.97	32.42	41.38	50.57	60.37	70.71	81.60	92.92
	Cubic Feet			3304	3575	3912	4183	4439	4679	4909	5124
	Revolutions			95	104	113	121	128	135	141	148
36	Horse Power				38.59	49.24	60.19	71.85	84.15	97.11	110.59
	Cubic Feet				4256	4655	4978	5283	5569	5842	6099
	Revolutions				95	103	111	117	123	129	135
39	Horse Power				45.29	57.79	70.64	84.33	98.76	113.97	129.83
	Cubic Feet				4995	5463	5843	6200	6536	6856	7161
	Revolutions				88	95	102	107	114	119	125
42	Horse Power				52.52	67.03	81.91	97.80	114.54	132.18	150.52
	Cubic Feet				5792	6337	6775	7191	7580	7952	8301
	Revolutions				82	89	94	100	105	111	116
45	Horse Power					76.95	94.05	112.27	131.49	151.74	172.80
	Cubic Feet					7274	7779	8255	8702	9128	9530
	Revolutions					82	88	93	99	103	107
48	Horse Power					87.55	107.00	127.74	149.60	172.64	196.60
	Cubic Feet					8277	8851	9393	9900	10386	10842
	Revolutions					77	81	87	91	95	100
51	Horse Power					98.83	120.80	144.21	168.89	194.90	221.95
	Cubic Feet					9343	9992	10603	11177	11725	12240
	Revolutions					71	77	81	85	89	93
54	Horse Power						135.43	161.67	189.34	218.50	248.83
	Cubic Feet						11202	11887	12531	13145	13723
	Revolutions						72	77	81	84	89
57	Horse Power						150.90	180.14	210.96	243.45	277.24
	Cubic Feet						12482	13245	13961	14646	15289
	Revolutions						68	72	77	80	84
60	Horse Power						167.20	199.60	233.76	269.76	307.20
	Cubic Feet						13830	14676	15470	16228	16942
	Revolutions						65	69	72	75	80

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Table for Improved "Cylinder Gate" Victor Turbines Under Heads of 13 to 22 Feet

Diameter of Wheel in In.	Horse Power. Cubic Feet Discharged. Revolutions per Minute	HEAD IN FEET. 13	14	15	16	17	18	19	20	21	22
15	Horse Power	21.65	24.20	26.84	29.56	32.34	35.28	38.26	41.33	44.46	47.67
	Cubic Feet	1102	1144	1184	1222	1259	1297	1333	1367	1401	1434
	Revolutions	338	350	364	376	387	398	409	420	430	441
18	Horse Power	31.19	34.85	38.64	42.59	46.58	50.81	55.14	59.52	64.08	68.6.
	Cubic Feet	1588	1647	1704	1761	1813	1868	1920	1969	2019	2066
	Revolutions	283	293	304	314	324	333	343	352	360	368
21	Horse Power	42.45	47.43	52.63	57.97	63.40	69.16	75.01	81.02	87.22	93.46
	Cubic Feet	2161	2242	2322	2397	2468	2542	2613	2681	2748	2811
	Revolutions	242	251	260	269	277	284	293	301	308	315
24	Horse Power	55.45	61.95	68.70	75.71	82.81	90.34	97.98	105.82	113.91	122.08
	Cubic Feet	2823	2928	3031	3131	3224	3321	3413	3502	3589	3672
	Revolutions	212	220	227	235	242	249	256	262	269	276
27	Horse Power	70.17	78.41	86.95	95.83	104.81	114.33	124.01	133.93	144.	4.50
	Cubic Feet	3572	3706	3836	3963	4080	4203	4319	4432	4543	4647
	Revolutions	188	194	202	209	215	221	227	233	238	245
30	Horse Power	86.64	96.81	107.35	118.31	129.40	141.16	153.10	165.35	178.00	190.75
	Cubic Feet	4411	4576	4736	4893	5037	5189	5332	5471	5608	5738
	Revolutions	169	176	182	188	193	200	205	210	215	221
33	Horse Power	104.83	117.41	129.89	143.15	156.57	170.80	185.25	200.07	215.38	230.80
	Cubic Feet	5337	5550	5730	5920	6095	6278	6452	6620	6787	6942
	Revolutions	154	160	166	171	177	181	187	191	196	201
36	Horse Power	124.76	139.40	154.58	170.36	186.33	203.27	220.46	238.10	256.31	274 68
	Cubic Feet	6351	6589	6820	7046	7254	7472	7678	7879	8076	8262
	Revolutions	140	146	151	156	161	166	170	174	179	183
39	Horse Power	146.42	163.60	181.42	199.94	218.68	238.56	258.73	279.44	300.82	322.36
	Cubic Feet	7454	7733	8004	8269	8513	8769	9011	9246	9479	9697
	Revolutions	129	135	139	144	148	152	157	161	165	169
42	Horse Power	169.81	189.74	210.40	231.88	253.62	276.67	300.07	324.09	348.88	373.87
	Cubic Feet	8645	8969	9283	9590	9873	10170	10451	10724	10993	11246
	Revolutions	121	125	129	134	138	141	146	150	154	157
45	Horse Power	194.94	217.82	241.53	266.19	291.15	317.61	344.47	371.98	400.50	429.18
	Cubic Feet	9924	10296	10656	11009	11334	11675	11998	12309	12620	12910
	Revolutions	113	116	121	125	128	133	136	139	143	147
48	Horse Power	221.79	247.83	274.81	302.87	331.26	361.36	391.93	422.71	455.68	488.32
	Cubic Feet	11291	11715	12124	12526	12895	13283	13651	13987	14358	14688
	Revolutions	104	109	112	116	119	123	126	129	133	136
51	Horse Power	250.38	279.78	310.24	341.91	373.96	407.95	442.45	477.86	514.42	551.26
	Cubic Feet	12747	13225	13687	14141	14558	14996	15410	15812	16209	16582
	Revolutions	96	101	105	107	111	114	117	121	124	126
54	Horse Power	280.71	313.66	347.81	383.32	419.25	457.35	496.04	535.74	576.72	618.03
	Cubic Feet	14291	14826	15345	15854	16321	16812	17237	17727	18172	18590
	Revolutions	92	95	99	102	105	109	112	114	117	121
57	Horse Power	312.77	349.48	387.53	427.09	467.13	509.58	552.69	596.92	642.58	688.60
	Cubic Feet	15922	16520	17098	17664	18185	18732	19250	19752	20247	20713
	Revolutions	88	91	93	97	100	103	105	110	111	114
60	Horse Power	346.56	387.24	429.40	473.24	517.60	564.64	612.40	661.40	712.00	763.00
	Cubic Feet	17643	18305	18945	19573	20150	20756	21330	21885	22435	22951
	Revolutions	82	86	89	92	94	98	100	103	105	110

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Table for Improved "Cylinder Gate" Victor Turbines Under Heads of 23 to 31 Feet

Diameter of Wheel in In.	Horse Power. Cubic Feet Discharged. Revolutions per Minute	HEAD IN FEET.								
		23	24	25	26	27	28	29	30	31
15	Horse Power	50.96	54.33	57.77	61.26	64.82	68.46	72.13	75.93	79.76
	Cubic Feet	1462	1498	1529	1559	1586	1618	1646	1675	1703
	Revolutions	451	459	469	479	488	497	506	514	523
18	Horse Power	73.20	78.24	83.19	88.23	93.16	98.60	103.86	109.35	114.87
	Cubic Feet	2106	2157	2202	2245	2283	2330	2370	2412	2452
	Revolutions	377	385	393	401	409	415	423	431	437
21	Horse Power	99.64	106.50	113.23	120.09	126.81	134.21	141.40	148.84	156.35
	Cubic Feet	2867	2936	2997	3056	3108	3171	3227	3283	3338
	Revolutions	322	330	336	343	349	356	361	368	375
24	Horse Power	130.14	139.10	147.90	156.86	165.64	175.29	184.69	194.32	204.22
	Cubic Feet	3744	3835	3914	3992	4060	4142	4215	4287	4360
	Revolutions	281	288	293	300	305	311	316	322	327
27	Horse Power	164.71	176.05	187.19	198.53	209.62	221.85	233.74	246.04	258.47
	Cubic Feet	4739	4853	4955	5053	5138	5242	5334	5427	5518
	Revolutions	250	255	260	266	271	276	281	286	290
30	Horse Power	203.35	217.35	231.10	245.10	258.80	273.90	288.58	303.76	319.10
	Cubic Feet	5850	5992	6117	6238	6343	6472	6585	6701	6813
	Revolutions	225	231	235	239	244	249	254	258	261
33	Horse Power	246.05	263.00	279.63	296.57	313.14	331.41	349.18	367.54	386.11
	Cubic Feet	7079	7251	7402	7548	7675	7831	7968	8108	8243
	Revolutions	205	210	214	218	223	226	231	235	238
36	Horse Power	292.82	312.97	332.78	352.94	372.67	394.41	415.55	437.41	459.50
	Cubic Feet	8424	8629	8808	8982	9134	9320	9483	9649	9810
	Revolutions	188	191	195	200	203	206	211	214	216
39	Horse Power	343.66	367.32	390.55	414.21	437.37	462.89	487.70	513.35	539.27
	Cubic Feet	9887	10127	10338	10541	10720	10937	11129	11324	11513
	Revolutions	172	177	180	183	188	191	194	198	201
42	Horse Power	398.55	426.00	452.95	480.39	507.24	536.84	565.61	595.36	625.43
	Cubic Feet	11466	11745	11990	12226	12432	12685	12907	13134	13353
	Revolutions	160	165	168	171	174	178	180	183	187
45	Horse Power	457.53	489.03	519.97	551.47	582.30	616.27	649.30	683.46	717.97
	Cubic Feet	13163	13482	13763	14035	14272	14562	14817	15077	15329
	Revolutions	150	152	156	159	162	166	168	171	174
48	Horse Power	520.57	556.41	591.61	627.45	662.52	701.18	739.87	777.62	816.89
	Cubic Feet	14976	15340	15660	15968	16238	16569	16884	17154	17440
	Revolutions	139	141	145	148	150	154	156	159	161
51	Horse Power	587.68	628.14	667.87	708.34	747.93	791.57	833.99	877.86	922.19
	Cubic Feet	16907	17318	17678	18027	18332	18705	19032	19366	19689
	Revolutions	129	132	135	137	140	143	145	148	150
54	Horse Power	658.85	704.21	748.87	794.12	838.51	887.43	935.00	984.18	1033.88
	Cubic Feet	18944	19415	19822	20210	20552	20970	21337	21711	22073
	Revolutions	123	125	128	130	133	136	138	140	144
57	Horse Power	734.09	784.63	834.27	884.81	934.26	988.77	1041.77	1096.57	1151.95
	Cubic Feet	21120	21632	22083	22518	22898	23364	23773	24190	24594
	Revolutions	117	118	122	124	126	128	130	133	135
60	Horse Power	813.40	869.40	924.40	980.40	1035.20	1095.60	1154.32	1215.04	1276.40
	Cubic Feet	23401	23969	24469	24951	25374	25889	26341	26804	27251
	Revolutions	111	113	115	117	119	122	124	126	128

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Table for Improved "Cylinder Gate" Victor Turbines Under Heads of 32 to 40 Feet

Diameter of Wheel in In.	Horse Power. Cubic Feet Discharged. Revolutions per Minute	HEAD IN FEET. 32	33	34	35	36	37	38	39	40
15	Horse Power	83.65	87.60	91.60	95.66	99.82	103.98	108.25	112.54	116.91
	Cubic Feet	1730	1756	1782	1809	1835	1860	1885	1910	1934
	Revolutions	531	540	547	555	564	572	579	587	590
18	Horse Power	120.45	126.14	131.90	137.75	143.74	149.74	155.88	162.09	168.38
	Cubic Feet	2491	2529	2567	2605	2642	2679	2714	2751	2785
	Revolutions	445	452	458	465	471	478	485	491	497
21	Horse Power	163.95	171.69	179.53	187.49	195.65	203.82	212.17	220.62	229.18
	Cubic Feet	3390	3442	3493	3545	3596	3646	3694	3744	3790
	Revolutions	380	386	392	398	403	409	414	420	425
24	Horse Power	214.15	224.25	234.49	244.88	255.55	266.21	277.12	288.16	299.34
	Cubic Feet	4428	4500	4563	4630	4697	4762	4825	4890	4951
	Revolutions	332	337	343	347	353	357	363	367	371
27	Horse Power	271.03	283.82	296.78	309.93	323.43	336.92	350.73	364.70	378.86
	Cubic Feet	5605	5690	5775	5861	5944	6027	6106	6189	6266
	Revolutions	294	300	304	309	313	317	322	325	330
30	Horse Power	334.61	350.40	366.40	382.64	399.30	415.96	433.00	450.25	467.73
	Cubic Feet	6920	7025	7130	7236	7339	7441	7538	7641	7736
	Revolutions	266	270	275	278	282	287	290	293	298
33	Horse Power	404.87	423.98	443.34	462.99	483.15	503.31	523.93	544.80	565.95
	Cubic Feet	8373	8501	8627	8755	8880	9004	9122	9245	9361
	Revolutions	243	246	249	254	257	260	265	268	271
36	Horse Power	481.83	504.57	527.61	551.00	575.00	598.97	623.52	648.36	673.53
	Cubic Feet	9964	10116	10267	10419	10568	10715	10855	11003	11140
	Revolutions	221	225	228	232	235	238	240	242	247
39	Horse Power	565.49	592.17	619.21	646.66	674.81	702.97	731.77	760.92	790.46
	Cubic Feet	11694	11873	12050	12228	12403	12576	12740	12913	13074
	Revolutions	204	207	211	213	216	220	222	225	228
42	Horse Power	655.83	686.78	718.14	749.97	782.62	815.28	848.68	882.49	916.75
	Cubic Feet	13562	13770	13975	14182	14384	14585	14775	14976	15163
	Revolutions	190	192	195	199	201	204	206	210	212
45	Horse Power	752.87	788.40	824.40	860.94	898.42	935.91	974.25	1013.06	1052.39
	Cubic Feet	15569	15807	16043	16280	16513	16743	16962	17192	17406
	Revolutions	177	180	182	185	188	190	193	195	198
48	Horse Power	856 60	897.02	937.98	979.55	1022.20	1064.85	1108 48	1152.64	1197.38
	Cubic Feet	17714	17985	18253	18523	18788	19050	19298	19560	19805
	Revolutions	165	167	169	171	173	177	179	181	183
51	Horse Power	967.02	1012.65	1058.89	1105.82	1153.97	1202.12	1251.37	1301.22	1351.74
	Cubic Feet	19998	20303	20606	20919	21210	21506	21786	22082	22358
	Revolutions	152	154	157	159	162	165	167	169	171
54	Horse Power	1084.13	1135.29	1187.13	1239.75	1293.73	1347.71	1402.92	1458.81	1515.43
	Cubic Feet	22420	22762	23101	23444	23779	24110	24422	24756	25065
	Revolutions	145	147	149	151	154	156	158	160	162
57	Horse Power	1207.94	1264.94	1322.70	1381.33	1441.47	1501.61	1563.13	1625.40	1688.50
	Cubic Feet	24980	25362	25740	26121	26494	26864	27214	27583	27928
	Revolutions	137	139	141	144	146	148	150	151	154
60	Horse Power	1338.44	1401.60	1465.60	1530.56	1597.20	1663.84	1732.00	1801.00	1870.92
	Cubic Feet	27679	28102	28520	28943	29356	29766	30154	30563	30945
	Revolutions	130	133	134	136	138	140	141	144	146

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	Horse Power, Cubic Feet Discharged, Revolutions per Minute.	HEAD IN FEET.									
		41	42	43	44	45	46	47	48	49	50
15	Horse Power	121.31	125.77	130.29	134.86	139.48	144.16	148.88	153.66	158.49	163.37
	Cubic Feet	1957	1981	2004	2028	2051	2073	2096	2118	2140	2162
	Revolutions.	601	608	615	623	630	637	644	650	657	664
18	Horse Power	174.70	181.13	187.63	194.22	200.88	207.61	214.42	221.29	228.25	235.27
	Cubic Feet	2819	2853	2887	2920	2953	2986	3018	3050	3082	3113
	Revolutions.	504	510	516	522	527	534	540	545	551	557
21	Horse Power	237.80	246.56	256.41	264.37	273.44	282.60	291.87	301.23	310.70	320.26
	Cubic Feet	3839	3886	3931	3977	4021	4066	4110	4153	4196	4239
	Revolutions.	431	436	441	446	451	456	461	466	471	476
24	Horse Power	310.54	321.97	333.53	345.24	357.07	369.04	381.14	393.37	405.73	418.21
	Cubic Feet	5014	5075	5135	5195	5253	5311	5369	5425	5481	5537
	Revolutions.	375	379	384	388	393	397	401	406	410	414
27	Horse Power	393.01	407.48	422.12	436.93	451.91	467.06	482.37	497.85	513.49	529.28
	Cubic Feet	6345	6423	6499	6574	6648	6721	6794	6866	6937	7008
	Revolutions	334	338	342	345	349	353	357	361	365	368
30	Horse Power	485.18	503.04	521.11	539.39	557.88	576.58	595.47	614.59	633.90	653.40
	Cubic Feet	7833	7928	8022	8115	8206	8297	8387	8476	8564	8650
	Revolutions	301	304	308	311	315	318	322	326	329	332
33	Horse Power	587.23	608.83	630.72	652.85	675.23	697.86	720.74	743.87	767.23	790.84
	Cubic Feet	9478	9593	9707	9819	9930	10039	10148	10256	10362	10467
	Revolutions	273	277	280	283	286	289	293	296	299	302
36	Horse Power	698.86	724.58	750.61	776.94	803.58	830.52	857.75	885.26	913.08	941.17
	Cubic Feet	11281	11418	11553	11687	11819	11949	12079	12206	12332	12458
	Revolutions	249	252	255	258	261	264	267	270	272	275
39	Horse Power	820.19	850.38	880.93	911.84	943.10	974.72	1006.67	1038.97	1071.61	1104.58
	Cubic Feet	13238	13398	13557	13714	13869	14022	14173	14323	14472	14619
	Revolutions	231	233	236	238	241	244	247	250	252	254
42	Horse Power	951.25	986.26	1021.69	1057.54	1093.80	1130.46	1167.52	1204.98	1242.83	1281.07
	Cubic Feet	15354	15541	15724	15906	16084	16264	16439	16613	16785	16956
	Revolutions	214	217	220	222	225	227	230	232	235	237
45	Horse Power	1091.81	1132.00	1172.40	1213.8'	1255.43	1297.51	1340.05	1383.04	1426.48	1470.04
	Cubic Feet	17624	17837	18048	18257	18463	18667	18869	19069	19266	19462
	Revolutions	200	202	204	206	209	211	213	215	217	220
48	Horse Power	1240.72	1286.38	1332.60	1379.35	1426.64	1474.46	1522.80	1571.65	1621.02	1670.91
	Cubic Feet	20050	20293	20534	20771	21001	21238	21467	21694	21929	22142
	Revolutions	185	187	189	191	193	195	198	200	202	204
51	Horse Power	1402.59	1454.21	1506.45	1559.29	1612.77	1666.83	1721.48	1776.70	1832.52	1888.90
	Cubic Feet	22639	22913	23185	23453	23718	23980	24239	24496	24749	25000
	Revolutions	173	175	177	179	181	183	185	187	189	191
54	Horse Power	1572.48	1630.35	1688.92	1748.18	1808.12	1868.72	1930.44	1991.91	2054.49	2117.69
	Cubic Feet	25381	25688	25992	26293	26590	26884	27175	27462	27747	28029
	Revolutions	163	165	167	169	171	173	175	177	178	180
57	Horse Power	1752.05	1816.53	1881.80	1947.82	2014.60	2082.13	2150.39	2219.38	2289.10	2359.53
	Cubic Feet	28280	28623	28962	29297	29625	29955	30279	30599	30917	31230
	Revolutions	157	159	161	163	165	167	169	170	172	174
60	Horse Power	1941.30	2012.75	2085.07	2158.23	2232.22	2307.04	2382.68	2459.11	2536.37	2614.40
	Cubic Feet	31334	31714	32089	32460	32827	33190	33549	33904	34255	34603
	Revolutions	148	149	151	153	154	156	158	160	161	163

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TABLE FOR

12-Inch Cylinder Victor Gate Wheel.

Head	3	4	5	6	7	8	9	10	11	12
Power	1.53	2.36	3 30	4.34	5.47	6 69	7.98	9.35	10.78	12.29
Cubic Feet	339	391	432	479	518	553	587	619	649	678
Revs.	203	234	262	287	310	332	352	371	389	406
Head	13	14	15	16	17	18	19	20	21	22
Power	13.86	15 49	17.18	18.92	20.72	22.58	24.49	26.45	28.45	30.51
Cubic Feet	705	732	758	783	807	830	853	875	897	918
Revs.	423	439	454	469	484	498	511	525	538	551
Head	23	24	25	26	27	28	29	30	31	32
Power	32.61	34 80	36.96	39.20	41.77	43.81	46.18	48.59	51.04	53 53
Cubic Feet	938	958	978	998	1017	1036	1054	1072	1090	1107
Revs.	563	575	587	598	610	621	631	642	653	664
Head	33	34	35	36	37	38	39	40	41	42
Power	56.06	58 62	61.23	63.87	66.55	69.27	72.02	74.81	77.63	80.49
Cubic Feet	1124	1141	1158	1174	1190	1206	1222	1238	1253	1268
Revs.	674	684	694	704	714	724	733	742	751	760
Head	43	44	45	46	47	48	49	50	51	52
Power	83.38	86 13	89.28	92 26	95.28	98.34	101.43	104.55	107.70	110.88
Cubic Feet	1283	1298	1312	1327	1341	1355	1369	1383	1397	1411
Revs.	769	778	787	796	805	813	821	830	838	846
Head	53	54	55	56	57	58	59	60	61	62
Power	114.10	117.34	120.62	123.92	127.26	130.62	134.01	137 43	140 88	144.36
Cubic Feet	1424	1437	1451	1464	1477	1490	1503	1516	1528	1540
Revs.	854	862	870	878	886	894	901	909	917	924
Head	63	64	65	66	67	68	69	70	71	72
Power	147.87	151.40	154.97	158.56	162 17	165 82	169.49	173.19	176.91	180.66
Cubic Feet	1552	1565	1577	1589	1601	1613	1625	1637	1649	1660
Revs.	931	939	946	953	960	968	975	982	989	996
Head	73	74	75	76	77	78	79	80	81	82
Power	184.44	188.24	192.07	195.93	199.81	203.71	207.64	211.60	215.57	219 58
Cubic Feet	1671	1683	1694	1705	1716	1728	1739	1750	1761	1772
Revs.	1003	1009	10'6	1023	1030	1036	1043	1050	1056	1063
Head	83	84	85	86	87	88	89	90	91	92
Power	223.16	227 66	231.74	235.84	239 97	244.12	248.29	252.49	256.71	260.95
Cubic Feet	1783	1793	1804	1815	1825	1835	1846	1856	1867	1877
Revs.	1069	1076	1082	1088	1095	1101	1107	1114	1120	1126
Head	93	94	95	96	97	98	99	100		
Power	265.21	269.51	273 82	278.15	282.51	286.89	291.29	295.72		
Cubic Feet	1887	1897	1907	1917	1927	1937	1947	1957		
Revs.	1132	1138	1144	1150	1156	1162	1168	1174		

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The "Register Gate" Victor Turbine.

Table for Small Wheels Under Heads From 3 to 50 Feet.

6 INCH WHEEL.				8 INCH WHEEL.				10 INCH WHEEL.				12 INCH WHEEL.			
Head in Feet.	Horse Power.	Cu. Ft. Disch'g'd per Minute.	Revolutions per Minute.	Head in Feet.	Horse Power.	Cu. Ft. Disch'g'd per Minute.	Revolutions per Minute.	Head in Feet.	Horse Power.	Cu. Ft. Disch'g'd per Minute.	Revolutions per Minute.	Head in Feet.	Horse Power.	Cu. Ft. Disch'g'd per Minute.	Revolutions per Minute.
3	0.33	69	350	3	0.43	88	267	3	0.83	176	212	3	1.21	251	171
4	0.51	79	400	4	0.71	109	308	4	1.29	198	243	4	1.88	289	197
5	0.71	89	445	5	1.02	128	345	5	1.77	221	272	5	2.60	324	221
6	0.91	98	490	6	1.34	140	377	6	2.35	243	299	6	3.42	355	242
7	1.15	106	530	7	1.67	151	407	7	2.93	262	324	7	4.30	383	261
8	1.42	113	570	8	2.05	162	435	8	3.57	280	346	8	5.25	409	279
9	1.70	120	605	9	2.44	171	463	9	4.25	297	366	9	6.17	433	296
10	2.00	127	638	10	2.82	180	487	10	5.03	314	383	10	7.35	458	311
11	2.30	133	660	11	3.31	189	512	11	5.78	328	403	11	8.46	480	327
12	2.65	139	691	12	3.79	197	533	12	6.57	343	424	12	9.64	501	342
13	3.00	144	725	13	4.28	206	555	13	7.43	358	441	13	10.88	525	356
14	3.35	150	755	14	4.73	211	576	14	8.28	371	457	14	12.14	542	369
15	3.75	155	785	15	5.21	216	598	15	9.23	384	474	15	13.49	562	382
16	4.05	160	814	16	5.76	223	616	16	10.07	397	488	16	15.19	579	395
17	4.40	164	842	17	6.30	229	636	17	11.05	409	503	17	16.29	597	407
18	4.80	169	867	18	6.90	236	653	18	12.00	422	519	18	17.73	614	419
19	5.20	174	890	19	7.43	244	670	19	13.05	432	533	19	19 66	630	430
20	5.72	179	910	20	8.00	251	687	20	14.22	443	550	20	20.74	646	441
21	6.15	184	935	21	8.64	257	704	21	15.12	454	562	21	22.32	663	452
22	6.65	188	959	22	9.26	263	720	22	16.25	466	574	22	23.92	678	463
23	7.10	192	979	23	9.90	269	737	23	17.37	475	586	23	25 58	692	474
24	7.57	196	997	24	10.50	274	752	24	18.50	485	598	24	27.27	708	484
25	8.05	200	1018	25	11.22	280	768	25	19.68	495	611	25	28.99	722	494
26	8.54	204	1038	26	11.90	285	783	26	20.84	505	623	26	30.73	736	504
27	9.05	209	1058	27	12.60	291	798	27	22.05	515	635	27	32 53	750	513
28	9.56	213	1077	28	13.32	296	813	28	23.33	525	647	28	34.35	765	522
29	10.06	217	1095	29	14.04	302	827	29	24.57	534	658	29	36.21	777	531
30	10.56	220	1113	30	14.78	307	840	30	26.19	544	670	30	38.11	791	540
31	11.10	224	1132	31	15.50	312	855	31	27.17	552	682	31	40.01	804	550
32	11.68	228	1151	32	16.25	317	869	32	28.52	560	691	32	41.97	816	559
33	12.24	232	1170	33	17.01	321	882	33	29.75	569	701	33	43.94	830	568
34	12.80	235	1188	34	17.82	327	896	34	31.23	577	712	34	45.99	842	576
35	13.38	238	1204	35	18.63	331	909	35	32.63	586	724	35	47.99	852	584
36	13.98	241	1220	36	19.41	336	922	36	33.99	594	735	36	50.10	866	592
37	14.53	244	1237	37	20.20	341	934	37	35.37	602	745	37	52.12	878	600
38	15.10	247	1254	38	21.06	345	947	38	36.90	611	754	38	54.32	889	608
39	15.65	250	1271	39	21 87	350	960	39	38.25	619	768	39	56.46	901	616
40	16.18	252	1287	40	22.72	354	972	40	40.23	626	772	40	58.59	928	624
41	16.97	256	1303	41	23.58	358	983	41	41.95	634	783	41	60.59	924	631
42	17.50	260	1319	42	24.45	362	995	42	43.29	643	794	42	62.82	936	639
43	18.15	263	1334	43	25.32	367	1007	43	44 82	651	806	43	65.10	948	646
44	18.85	266	1351	44	26.21	371	1019	44	46 39	660	816	44	67.28	960	654
45	19.50	270	1367	45	27.13	374	1031	45	47.97	665	825	45	69.66	970	661
46	20.13	273	1382	46	28.03	378	1042	46	49.59	671	835	46	71.93	981	669
47	20.83	276	1397	47	28.95	382	1053	47	51.21	678	844	47	74 30	989	676
48	21.50	279	1412	48	29.88	387	1064	48	52.87	686	854	48	76.67	1002	683
49	22.20	282	1426	49	30.82	391	1075	49	54.54	693	865	49	79 06	1012	689
50	22.80	284	1440	50	31.77	395	1086	50	56.25	700	876	50	81 53	1022	697

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The "Register Gate" Victor Turbine.

Table for Small Wheels Under Heads From 51 to 100 Feet.

6 INCH WHEEL.				8 INCH WHEEL.				10 INCH WHEEL.				12 INCH WHEEL.			
Head in Feet.	Horse Power.	Cu. Ft. Disch'g'd per Minute.	Revolutions per Minute.	Head in Feet.	Horse Power.	Cu. Ft. Disch'g'd per Minute.	Revolutions per Minute.	Head in Feet.	Horse Power.	Cu. Ft. Disch'g'd per Minute.	Revolutions per Minute.	Head in Feet.	Horse Power.	Cu. Ft. Disch'g'd per Minute.	Revolutions per Minute.
51	23 50	287	1454	51	32.69	398	1097	51	57.96	707	885	51	83.94	1032	704
52	24.20	290	1468	52	33.66	402	1108	52	59.59	715	894	52	86.47	1043	711
53	24.90	293	1482	53	34.65	406	1118	53	61.33	722	903	53	88.97	1053	718
54	25.60	295	1496	54	35.68	409	1129	54	63.09	729	912	54	91.46	1064	725
55	26.35	298	1505	55	36.67	413	1139	55	64.80	735	920	55	94.09	1071	731
56	27.05	301	1513	56	37.66	417	1150	56	66.60	742	928	56	96.58	1084	738
57	27.80	304	1530	57	38.53	420	1160	57	68.40	748	936	57	99.24	1093	744
58	28.55	306	1544	58	39.60	425	1170	58	70.20	755	944	58	101.91	1102	751
59	29.25	309	1558	59	40 63	428	1180	59	72.04	761	952	59	104.58	1112	757
60	30.00	311	1577	60	41.59	432	1190	60	73.89	767	960	60	107.19	1122	764
61	30.80	313	1589	61	42.75	436	1200	61	75.73	776	967	61	109.86	1129	770
62	31.55	316	1602	62	43.82	439	1210	62	77.58	782	974	62	112.57	1140	776
63	32.35	319	1614	63	44.86	443	1220	63	79.47	787	981	63	115.24	1148	782
64	33.15	322	1628	64	45.90	446	1229	64	81.38	793	988	64	118.25	1157	789
65	33.92	324	1641	65	47.07	450	1238	65	83.34	799	996	65	120.93	1166	795
66	34.60	327	1654	66	48.15	453	1248	66	85.23	805	1004	66	123.67	1175	801
67	35.40	330	1668	67	49.24	457	1257	67	87.16	810	1011	67	126.42	1184	807
68	36.20	333	1680	68	49.95	460	1266	68	89.10	816	1018	68	129.30	1193	813
69	37.00	336	1691	69	51.45	464	1276	69	91.08	823	1025	69	132.18	1201	819
70	37.83	339	1703	70	52.53	467	1285	70	93.10	829	1032	70	135.02	1210	825
71	38.65	341	1714	71	53.19	470	1294	71	95.08	836	1038	71	137.94	1218	831
72	39.50	343	1726	72	54.90	473	1304	72	97.13	841	1044	72	140.87	1226	836
73	40.30	345	1738	73	56.07	477	1313	73	99.18	847	1050	73	143.79	1235	842
74	41.05	347	1751	74	57.17	480	1321	74	101.20	854	1057	74	146.83	1243	848
75	41.90	348	1764	75	58.36	483	1330	75	103.23	859	1064	75	149.81	1251	854
76	42.75	350	1778	76	59.49	486	1339	76	105.30	865	1070	76	152.71	1260	860
77	43.60	353	1790	77	60.68	489	1348	77	107.41	870	1077	77	155.79	1268	865
78	44.50	355	1800	78	61.88	492	1357	78	109.53	876	1084	78	158.68	1277	871
79	45.35	357	1810	79	63.00	495	1365	79	111.60	881	1090	79	161.68	1283	876
80	46.20	359	1821	80	64.30	498	1374	80	113.76	886	1096	80	165.12	1293	882
81	46.62	360	1831	81	65.20	505	1382	81	115.90	891	1107	81	169.04	1300	887
82	47.48	362	1842	82	66.41	508	1391	82	118.05	897	1114	82	172.18	1309	893
83	48.36	364	1853	83	67.63	511	1400	83	120.22	902	1120	83	175.34	1316	898
84	49.23	367	1865	84	68.86	514	1408	84	122.39	908	1127	84	178.51	1324	904
85	50.11	369	1876	85	70.09	517	1416	85	124.59	913	1134	85	181.71	1332	909
86	51.00	371	1887	86	71.33	520	1424	86	126.79	919	1141	86	184.93	1340	914
87	51.90	373	1898	87	72.58	523	1433	87	129.01	924	1147	87	188.17	1347	920
88	52.79	375	1909	88	73.84	526	1441	88	131.24	929	1154	88	191.42	1355	925
89	53.70	377	1920	89	75.10	529	1449	89	133.49	934	1160	89	194.69	1363	930
90	54.61	380	1931	90	76.37	532	1457	90	135.74	940	1167	90	197.98	1371	935
91	55.52	382	1941	91	77.65	535	1465	91	138.01	945	1173	91	201.29	1378	941
92	56.43	384	1952	92	78.92	538	1473	92	140.27	950	1180	92	204.59	1386	946
93	57.35	386	1963	93	80.22	541	1481	93	142.58	955	1186	93	207.99	1393	951
94	58.28	388	1973	94	81.51	544	1490	94	144.89	960	1192	94	211.32	1400	956
95	59.21	390	1983	95	82.82	547	1497	95	147.21	965	1199	95	214.71	1408	961
96	60.15	392	1994	96	84.13	550	1505	96	149.54	971	1205	96	218.11	1415	966
97	61.10	394	2004	97	85.45	553	1513	97	151.89	975	1211	97	221.52	1423	971
98	62.04	396	2014	98	86.77	556	1521	98	154.24	981	1217	98	224.95	1430	976
99	63.00	398	2024	99	88.11	559	1528	99	156.60	986	1223	99	228.41	1438	981
100	63.95	400	2035	100	89.45	561	1536	100	158.98	990	1229	100	231.88	1444	986

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DIMENSIONS OF ORDINARY WOOD FLUME AND PIT.

Lettered Columns Correspond With Lines in Plate on Opposite Page.

SIZE OF WHEEL	A	B	C	D	E	F
12	4 ft. 6 in.	1 ft. 10 in.	5 ft. 0 in.	3 ft. 0 in.	6 in.	2 ft. 4 in.
15	5 ft. 0 in.	2 ft. 3 in.	5 ft. 6 in.	3 ft. 0 in.	6 in.	2 ft. 10 in.
18	5 ft. 6 in.	2 ft. 8 in.	6 ft. 0 in.	3 ft. 0 in.	6 in.	3 ft. 4 in.
21	6 ft. 0 in.	3 ft. 1 in.	6 ft. 6 in.	3 ft. 6 in.	6 in.	3 ft. 9 in.
24	7 ft. 0 in.	3 ft. 6 in.	7 ft. 6 in.	3 ft. 9 in.	6 in.	4 ft. 3 in.
27	8 ft. 0 in.	3 ft. 11 in.	8 ft. 6 in.	4 ft. 0 in.	6 in.	4 ft. 8 in.
30	9 ft. 0 in.	4 ft. 4 in.	9 ft. 6 in.	4 ft. 6 in.	6 in.	5 ft. 2 in.
33	10 ft. 0 in.	4 ft. 9 in.	10 ft. 6 in.	5 ft. 0 in.	6 in.	5 ft. 7 in.
36	10 ft. 6 in.	5 ft. 2 in.	11 ft. 0 in.	5 ft. 6 in.	9 in.	6 ft. 0 in.
39	11 ft. 6 in.	5 ft. 6 in.	12 ft. 0 in.	5 ft. 6 in.	9 in.	6 ft. 5 in.
42	12 ft. 6 in.	6 ft. 0 in.	13 ft. 0 in.	5 ft. 9 in.	9 in.	6 ft. 10 in.
45	13 ft. 6 in.	6 ft. 5 in.	14 ft. 0 in.	6 ft. 0 in.	9 in.	7 ft. 5 in.
48	14 ft. 6 in.	6 ft. 10 in.	15 ft. 0 in.	6 ft. 6 in.	9 in.	7 ft. 10 in.
51	16 ft. 0 in.	7 ft. 3 in.	16 ft. 6 in.	6 ft. 6 in.	12 in.	8 ft. 3 in.
54	17 ft. 0 in.	7 ft. 8 in.	17 ft. 6 in.	7 ft. 0 in.	12 in.	8 ft. 8 in.
57	18 ft. 6 in.	8 ft. 1 in.	19 ft. 0 in.	7 ft. 0 in.	12 in.	9 ft. 2 in.
60	20 ft. 0 in.	8 ft. 6 in.	20 ft. 6 in.	7 ft. 6 in.	12 in.	9 ft. 7 in.

NOTE—The above table is based on 20 feet head or less. For dimensions of Wheels see page 19.

See instructions for setting Wheels and construction of Head Races, Flumes and Tail Races in back part of catalogue.

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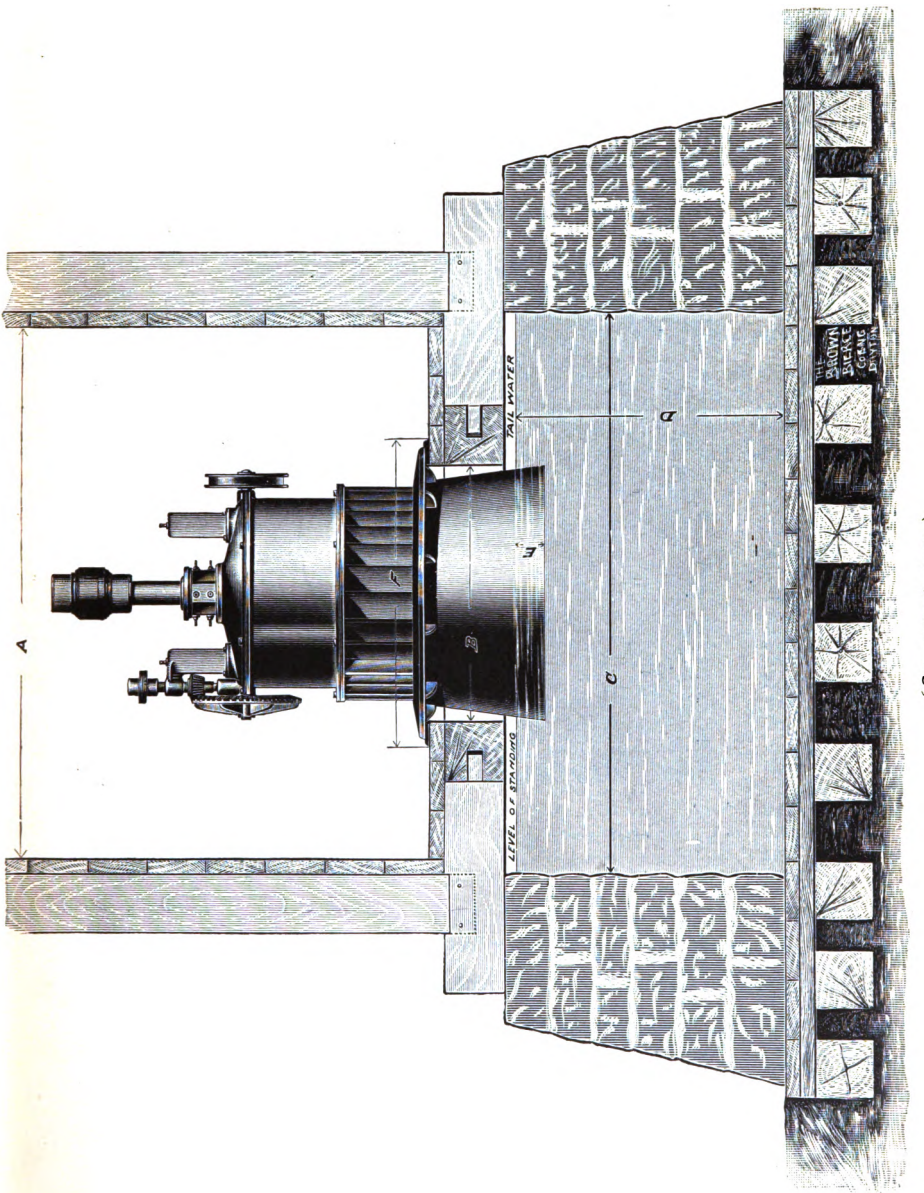

(See opposite page.)

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PRICE LIST OF
Improved "Cylinder Gate" Victor Turbines
Of Standard Pattern and Weight.

AS ILLUSTRATED ON PAGE 4.

IN SELECTING a Turbine, do not overlook the fact that it costs just as much to install a poor one as a good one, and that increased power, from a given quantity of water, will quickly compensate for the increased first cost of the superior Wheel.

SIZE OF WHEEL	LIST PRICE	SQ. IN. OF WATER USED	APPROXIMATE WEIGHT
12 inch	.....	60	.....
15 inch	.....	90	.....
18 inch	.....	130	.....
21 inch	.....	179	.....
24 inch	.....	231	.....
27 inch	.....	294	.....
30 inch	.....	365	.....
33 inch	.....	442	.....
36 inch	.....	520	.....
39 inch	.....	617	.....
42 inch	.....	717	.....
45 inch	.....	821	.....
48 inch	.....	927	.....
51 inch	.....	1055	.....
54 inch	.....	1184	.....
57 inch	.....	1318	.....
60 inch	.....	1463	.....

See explanation of this term on page 21

In comparing prices with other Wheels, compare the power developed by the respective Wheels, and compute the price per horse-power.

In ordering, always be careful to state in which direction the Wheel must turn.

In ordering Wheels, state whether they are to run **with the sun, or against the sun.**

With the Sun, or Right Hand. *Against the Sun, or Left Hand.*

THE STILWELL-BIERCE & SMITH-VAILE CO.,

January 1, 1901. DAYTON, OHIO.

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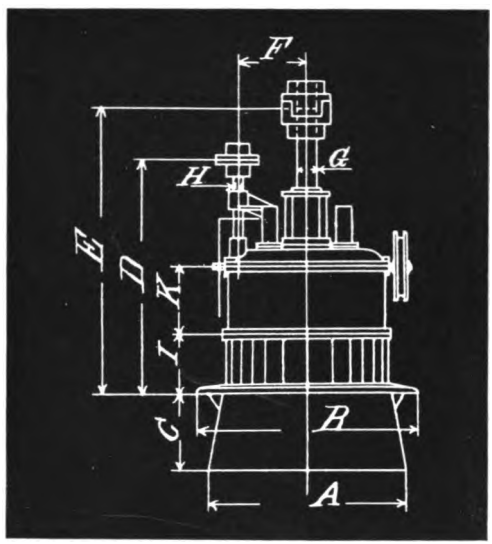
TABLE OF DIMENSIONS OF THE IMPROVED "CYLINDER GATE" VICTOR TURBINE.

Letters in Columns Below Correspond with Same Letters in Engraving.

All Dimensions Are Given in Inches.



SIZE	A	B	C	D	E	F	G	H	I	K
12	21	26½	9½	28	35	8¾	2 3/16	1 3/16	7½	9¼
15	26	32	12	34	44	10⅝	2 7/16	1 7/16	9	11 3/16
18	31	37½	14½	39	49	12 5/16	3 3/16	1 7/16	11 1/16	12⅜
21	36	43	17	47	56	14½	3 7/16	1 1/16	12½	14¾
24	41	48	19	49	58	16 7/16	3 7/16	1 1/16	14	16
27	46	53½	21½	52	63	18⅜	3 5/16	1 1/16	15 7/16	17⅛
30	51	59	24½	57	68	19 7/16	4⅜	1 1/16	16 3/16	19⅛
33	56	64	26½	60	72	21 7/16	4⅜	1 1/16	18⅜	20⅝
36	61	69½	29	64	74	23¼	4⅞	1 5/16	19 9/16	21⅝
39	65	74	31	69	80	25⅛	5⅜	1 5/16	21 3/16	23
42	71	80	33½	75	89	27	5⅞	1 5/16	22 1/16	25¼
45	76	85½	36	78	96	28¾	6⅜	1 5/16	24	27
48	81	90½	38½	79	99	31 3/16	6⅜	1 5/16	27 1/16	27⅛
51	86	96	41	83	105	32⅛	6⅞	1 5/16	27¼	30⅝
54	91	101	43	88	114	34	7½	1 5/16	29⅝	33
57	96	106½	45½	97	118	36⅜	7⅞	2 1/16	30 5/16	34⅝
60	101	112	48	102	126	37⅝	8⅜	2 5/16	31¾	36

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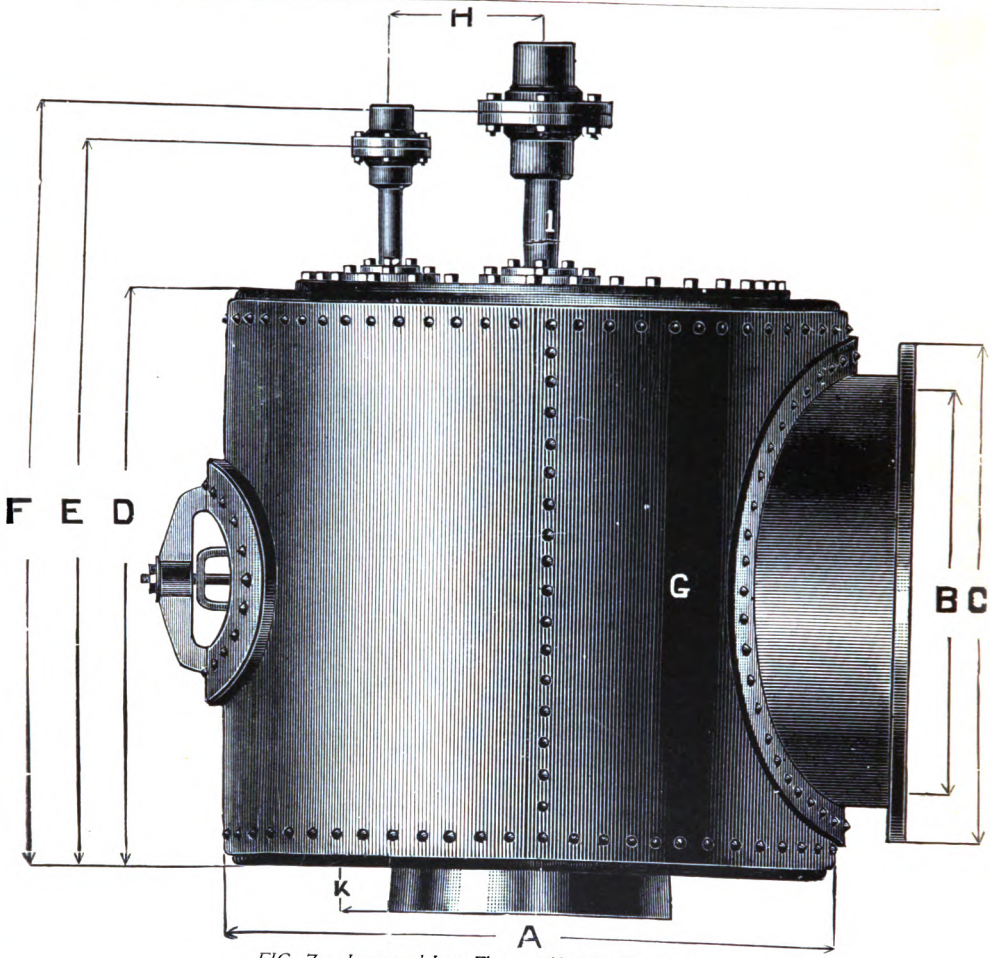

FIG. 7.—Improved Iron Flume, with Wheel in Position.

DIMENSIONS OF IMPROVED IRON FLUMES FOR "CYLINDER GATE" WHEELS.

All Dimensions Are Given in Inches.

SIZE OF WHEEL	A	*B	C	D	E	F	†G	H	I	‡J	K
12 inches.....	36	28	35	44	56	59	27	8½	2 3/16	See table page 19.	
15 inches.....	48	33	41	48	60	63	30	10 5/8	2 1/16		
18 inches.....	60	36	44	54	66	69	36	12 1/16	3 3/16		
21 inches.....	66	42	50	60	72	75	39	14½	3 1/16		
24 inches.....	72	52	60	66	78	87	42	16 7/16	3 1/16		
27 inches.....	84	60		78	90	99	48	18 3/8	3 1/16		
30 inches.....	90	68		84	96	103	51	19 7/16	4 3/8		
33 inches.....	96	78		96	110	120	54	21 1/16	4½		
36 inches.....	102	84	Cast iron flanges not used in these sizes.	102	114	124	57	23¼	4 3/8		
39 inches.....	108	90		108	120	132	60	25 1/8	5 3/8		
42 inches.....	114	96		114	124	136	63	27	5 3/8		
45 inches.....	120	104		120	132	144	66	28 3/4	6 3/8		
48 inches	120	110		126	138	150	66	31 1/16	6 3/8		
51 inches.....	132	120		138	150	162	72	32 1/8	6 7/8		
54 inches.....	132	126		144	156	168	72	34	7½		
57 inches.....	144	132		150	162	174	78	36 3/8	7 7/8		
60 inches.....	144	138		156	168	180	78	37 5/8	8 3/8		

*B is diameter of feeder—subject to change to suit varying conditions.
†G is distance from face of flange B to center of wheel shaft.
‡J is diameter of cylinder of wheel case, projecting below the flume.

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IRON FLUMES AND PENSTOCKS.

ON PRECEDING page we present an engraving (Fig. 7) illustrating our Improved Iron Flume, or outer case, such as we use for Wheels of any diameter. It is made, as the engraving represents, of cast iron heads and steel plate sides, and is provided with a movable cap, so that the Wheel can be taken out entire, the opening being large enough for that purpose. The cast iron flange at side, for connecting with either iron or wood supply pipe, or vertical penstock, is furnished only with flumes for Wheels 24 inches and smaller. For Wheels larger than 24 inches the connection of supply pipe to flume is made a telescope joint to be riveted. All flumes 10 feet in diameter and larger are made in halves. The cover is provided with stuffing boxes for both Wheel shaft and gate stem, and a manhole affords ready access to the Wheel for examination or for removing obstructions.

In connection with this flume an iron draft tube of any desired length may be used.

SQUARE INCHES OF WATER VENTED BY THE "CYLINDER GATE" VICTOR TURBINE

As Given on Page 18.

Our correspondence indicates a frequent misapprehension of the meaning of the term "square inches of water vented." Some seem to think that in a Wheel said to use "100 square inches of water" it is meant that the entire area of the chute apertures measures 100 square inches; others think the meaning to be that the entire area of the discharge apertures is 100 square inches. Neither of these views is correct, but the meaning is that the **theoretical discharge,** under any head due to an aperture measuring 100 square inches in cross section, would equal the **actual discharge** of the Wheel under the same head. A "square inch of water" means a stream exactly one inch square, and equal in length to the theoretical velocity in feet per second due to the head from under which it issues. For a head of four feet, this length would be 16.04 feet per second, for a head of ten feet, 25.36 feet per second. This velocity in feet per second and the equivalent of a "square inch of water," expressed in cubic feet per minute, under heads of from 1 to 40 feet, appear in table of "velocity and discharge of water through submerged orifices."

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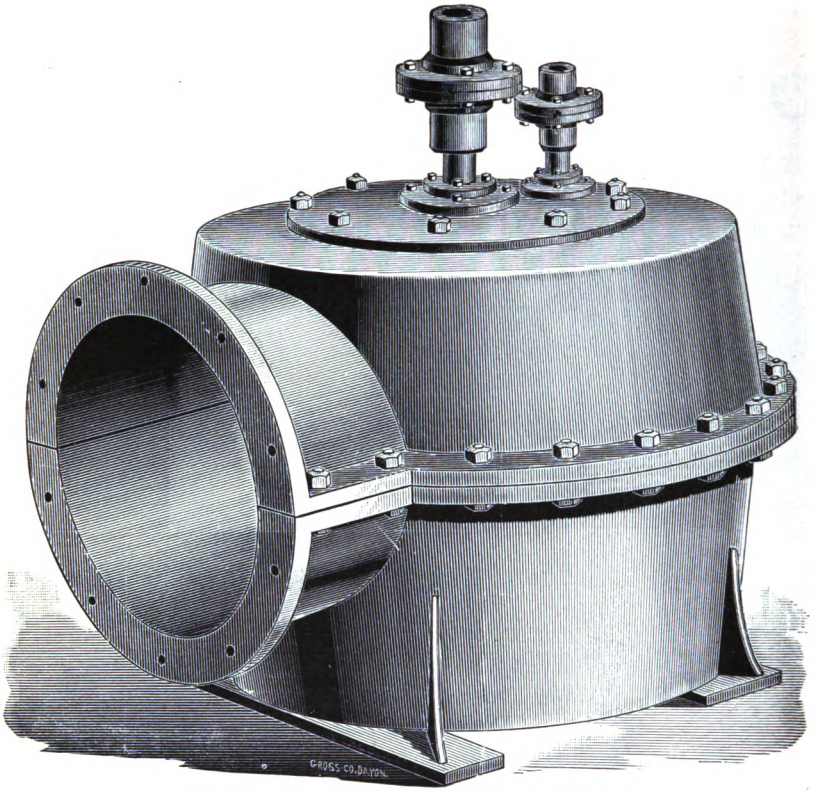

FIG. 8.—Cast-Iron Flume, with Wheel in Position.

PRICES OF CAST-IRON FLUMES FOR SMALL "REGISTER GATE" WHEELS.

(Dimensions on Opposite Page.)

Size of Wheel.....	6 inch	8 inch	10 inch	12 inch
Price of Flume.....	$100 00	$125 00	$150 00	$175 00
Approximate Weight.....	780	935	1200	2200

Cast-Iron Flumes are not recommended for Wheels larger than 12 inch, nor for Wheels of any size under falls exceeding 40 to 50 feet.

Prices and plans for all descriptions of iron flumes, draft tubes, supply pipes, etc., furnished on application.

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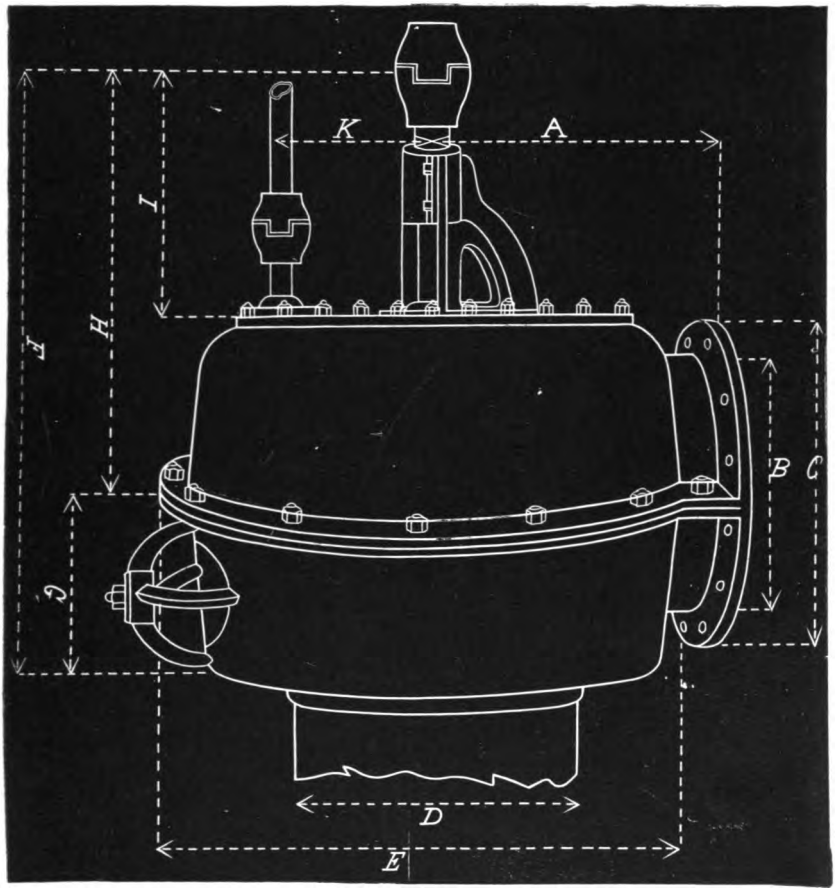

FIG. 9.—Outline Engraving of Cast-Iron Flumes.

TABLE OF DIMENSIONS OF CAST-IRON FLUMES.

Letters at Heads of Columns Correspond with Dotted Lines in Above Plate.

SIZE OF WHEEL	A Distance from Face of Flange of Inlet to Center of Wheel Shaft	B Diameter of Bore of Inlet Pipe	C Distance Across Flange of Inlet	D Diameter of Outlet Pipe or Cylinder	E Entire Diameter of Flume	F Distance from Bottom of Flume to Top of Wheel Shaft	K Distance Between Center of Wheel Shaft and Gate Shaft
6 inch.....	16¾ in.	14 in.	20 in.	10 in.	32½ in.	30½ in.	4⅝
8 inch.....	18¼ in.	16 in.	21½ in.	13⅞ in.	35⅝ in.	36⅞ in.	6½
10 inch.....	23⅜ in.	24 in.	29⅞ in.	16 in.	46½ in.	44¼ in.	6⅞
12 inch.....	24¼ in.	25½ in.	32½ in.	18¼ in.	48 in.	45½ in.	8¼

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THE VICTOR TURBINE ON HORIZONTAL SHAFTS.

THE idea of placing Turbines on horizontal shafts is not entirely new. Tentative efforts in that direction have been made from time to time, mainly confined to small wheels and light powers, but we were the first in the field with designs for large powers that have proved entirely satisfactory, both in mechanical construction and percentage of useful effect.

In the following pages we illustrate several different designs of our Victor Turbine on horizontal shafts, made by us to meet the requirements of the situations where they are placed.

The Turbines can be arranged singly or in pairs, and of any size, and the style of flume and the arrangement of draft tubes and supply pipes can be made to conform to the requirements of the situation, frequently saving largely in the expense of excavations and appliances for transmitting the power over what would be required if Turbines of the ordinary pattern were used.

The use of a pair of Twin Wheels is preferable, as they counterbalance each other, thus avoiding all end thrust of the shaft; but the single wheel can be used without difficulty if preferred, as our arrangements for insuring cool bearings and perfect lubrication are very complete.

We especially recommend the use of Turbines on horizontal shafts, where the situation admits of it, for driving dynamos, textile fabric machinery, wood pulp grinders, saw mills, and, in fact almost any kind of rapid-running machinery; and the advantage of transmitting the power by means of straight belts, direct from the water-wheel shaft, thus dispensing with gears, will be apparent to all.

In adapting these horizontal Turbines to pulp mills, it frequently happens that the speed is such as to admit of coupling the pulp grinders direct to the turbine shaft, thus dispensing entirely with intermediate gearing. We also frequently plan for direct connection with electric generators.

The construction of the Victor Turbine is such as to **particularly adapt it for use on horizontal shafts;** in fact, in point of adaptability for this purpose, it is far superior to any other in the market.

We have put in a large number of plants of this kind for some of the most prominent firms in the country, and we invite a careful inspection of the quality of our work, which we know to be the best ever produced. **None of these illustrations are fancy sketches, but all of them are made from plants in operation,** and indicate the wide range of our work in this line.

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We have constantly in our employ a corps of competent engineers, whose services can be had on application, to make surveys of water powers and plans for their improvement.

In applying for information about these Wheels, please give full particulars as to fall and quantity of water available, kind of machinery to be driven, power required, and send sketch of situation, and we can then inteligently advise as to Turbines best adapted for the purposes and quote prices for the same.

VERY IMPORTANT INFORMATION FOR PURCHASERS OF TURBINES ON HORIZONTAL SHAFTS.

THE Improved Horizontal Thrust Bearing used by us in our Horizontal Wheel Settings is broadly covered by Letters Patent No. 384,630, dated June 19, 1888, granted to A. C. Rice and assigned to us. It dispenses with all packing glands; provides for the shaft a perfect oil bearing, prevents leakage of water or air and **is readily accessible in all its parts for repairs without disturbing the Wheel.** We believe this patent bearing indispensable to satisfactory results in the use of horizontal Wheels and to be far superior to any other device for similar purposes.

Letters Patent Nos. 620,964 and 621,141 granted by United States to A. C. Rice, March 14, 1899, and assigned to us, cover what we believe to be the most valuable improvements of recent years in the construction of turbines operating on horizontal shafts.

We present herewith reproductions of the Patent Office drawings of these patents, and call attention to the following brief statement of the advantages gained over all previous methods.

Referring to Patent No. 620,964, it shows two Wheels on horizontal shafts, both Wheels discharging into one draft-tube. The construction shown so connects the draft-chamber casing, the chute-cases, and the cylinders or domes within which the gates move, with the flume-heads, that a perfect alignment of the chute-cases with the Water Wheels is insured, and the wheel-shaft is relieved of all pressure or strain excepting that which is due to the action of the water.

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No. 620,964. Patented Mar 14, 1899.

A. C. RICE

TURBINE.

(Application filed May 9, 1898.)

(No Model.)

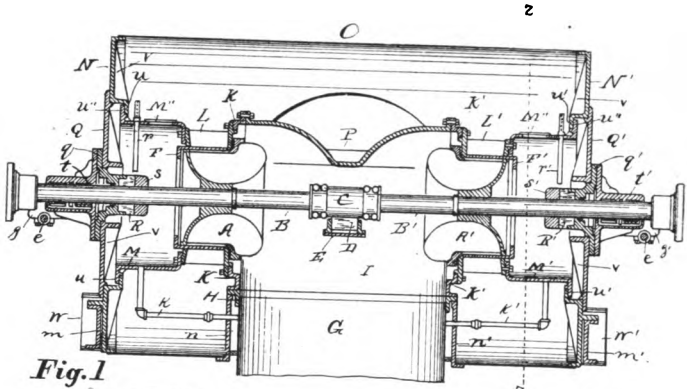

Fig. 1

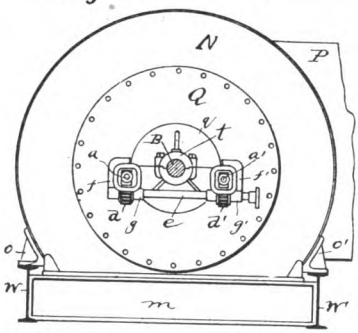

Fig. 2

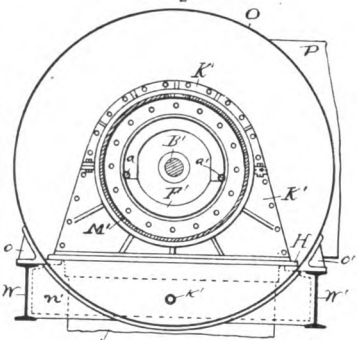

Fig. 3

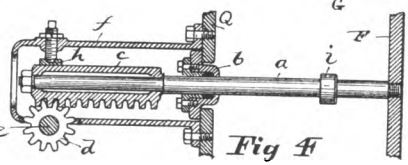

Fig 4

WITNESSES:
John W. Kallfelz
W. F. Voss

A. C. Rice
INVENTOR

BY R. G. McCart
ATTORNEY.

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Another result obtained is, the bearings for the wheel shaft are so constructed and located as to maintain a perfect alignment of the shaft.

Another most desirable result is, such an arrangement of the several parts constituting the wheel casing, that the gate rings and Wheels will be easily accessible, and the mechanism for operating the gates is located **on the outside of the flume-head where it is easily accessible for inspection and repairs,** without interfering with the other parts of the Wheel.

This is accomplished as follows:

The cylinder gates F F′ are operated by rods *a a′*, one of which is connected to each side of each of said gates. These actuating rods pass through packing-boxes *b* in the flume head covers and have on their outer ends racks *c*, that engage with pinions *d d′*, keyed to transverse shafts *e*, which are operated by a hand-wheel or in any suitable manner. The racks and pinions are inclosed in housings *f f′*, which are bolted to the flume-head covers. The said housings also provide bearings *g g′* for the shafts *e* and support adjustable bearing-plates *h*, which preserve a proper alignment of said gate-rods. Each of the gate-rods *a a′* has a collar *i*, that acts as a stop to limit the movement of the gates to their full opening. The cylinders M M′ are kept free from water and the oil-bearings protected by means of drain-pipes *k k′*, which discharge from said cylinders into the draft-tube, the discharge of water from the Wheels creating a suction that has the effect of drawing the water through said pipes. The thrust-bearings *s s′* are lubricated by means of pipes *r r′*, that pass into the cylinders and discharge water directly onto the surface between the wood steps and the collars.

The foregoing improvements are covered by the following claims which we copy from the Letters Patent, viz:

1. In a horizontal Water Wheel having a central discharge, the combination with a flume-casing the heads of which project inwardly and terminate in openings surrounded by annular flanges, dome-cylinders M and M′ rigidly sustained on said annular flanges, covers closing the openings in the flume-heads and lying flush with the outer surfaces of said flume-heads, chute-cases bolted to said dome-cylinders, and a central draft-chamber casing bolted to said chute-cases, the flume-heads thus forming rigid supports for the casings whereby said casings are maintained in a

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proper alignment, and bearings for the wheel-shaft in the flume-head covers and central draft-chamber, substantially as described.

2. In a horizontal Water Wheel having a central discharge, the combination with a flume-casing a portion of the heads of which project in and form the openings therein, and covers closing said openings, of dome-cylinders connected to said inwardly projected portions of said flume-heads, chute-cases, a central draft-chamber casing disposed between and connected to said chute-cases and communicating with the central discharge, Water Wheels A and A′ and the shaft thereof, the latter having bearings in the flume-head covers and in the draft-chamber casing, substantially as described.

3. In a horizontal Water Wheel having a central discharge, the combination with a flume the heads of which are projected in and terminate in openings, covers closing said openings, dome-cylinders sustained on said inwardly-projected heads, chute-cases rigidly sustained on said dome-cylinders, a centrally-disposed draft-chamber casing rigidly supported on said chute-cases, cylinder-gates movable in and out of said chute-cases and dome-cylinders to regulate the admission of water to the Wheels, actuating-rods connected to the sides of said gates and passing out through the flume-head covers, gearing supported on said flume-head covers for operating said rods, and means for preserving a proper alignment of said rods, substantially as described.

LETTERS PATENT No. 621,141.

This invention relates to Water Wheel systems, and has special reference to that class of Turbine Wheels now in such frequent demand, in which one or more Wheels may be mounted on a horizontal shaft and arranged to discharge into one or more draft-tubes.

The principal advantages gained by this invention are:

First: To so unite and group the various parts comprising a Water Wheel system that **the space required for setting two or more Wheels is reduced to a minimum.**

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Second: Locating the gate-operating mechanism on the outside of the flume-head cover in order that the **working parts may be free from contact with water and easily accessible for repairs.**

Third: The draft-chamber, chute-cases and dome-cylinders are constructed and mounted in such a manner as insures a **perfect alignment of the several parts constituting the wheel casing.**

Fourth: A combined bearing and shaft coupling is provided by means of which two or more shafts may be joined, and said coupling also constitutes a water bearing in which the frictional pressure per square inch is greatly reduced, as compared with other bearings for like purposes.

Fig. 1 is a central vertical longitudinal section of a Water Wheel system in accordance with the invention. This shows only one pair of Turbine Wheels, but the system could be extended by attaching at point indicated by line Z' Z' additional Wheels, either single or in pairs as might be desired.

Fig. 2 is a longitudinal section of the gate mechanism. Figs. 3 and 4 are detached elevations of the gates, the actuating rods thereof appearing in section. Fig 5 is a cross section on the line Z Z of Fig 1. Fig. 6 is a front elevation of the flume-head and cover, showing the gate-operating mechanism on the latter; and Fig. 7, side and and end views, respectively, of the two-part sleeve or shaft-coupling.

The system is especially designed for an open masonry flume, therefore the flume, with the exception of the head wall, is omitted from the drawings here shown. It will be seen that the dome-cylinder O is wholly within the wall, and it is apparent that by so placing it less space is needed for setting the Wheels, the amount of space so economized being equal to the horizontal width of the said wall. This is an exceedingly important and valuable feature as will appear more clearly further on. Without going into full details of construction, we will point out the principal features, reference being had to the drawings.

There is bolted to the flume-head cover P a packing-box R, which is provided with suitable packing-gland, secured to the outer surface of which is a ring oiling-bearing S, made in halves. The draft-chamber casing F being rigidly supported by the draft-tube ring K and having secured to it the chute-cases N N', which are bolted to the dome-cylinders H and O, as hereinbefore described, the several parts are kept in perfect alignment.

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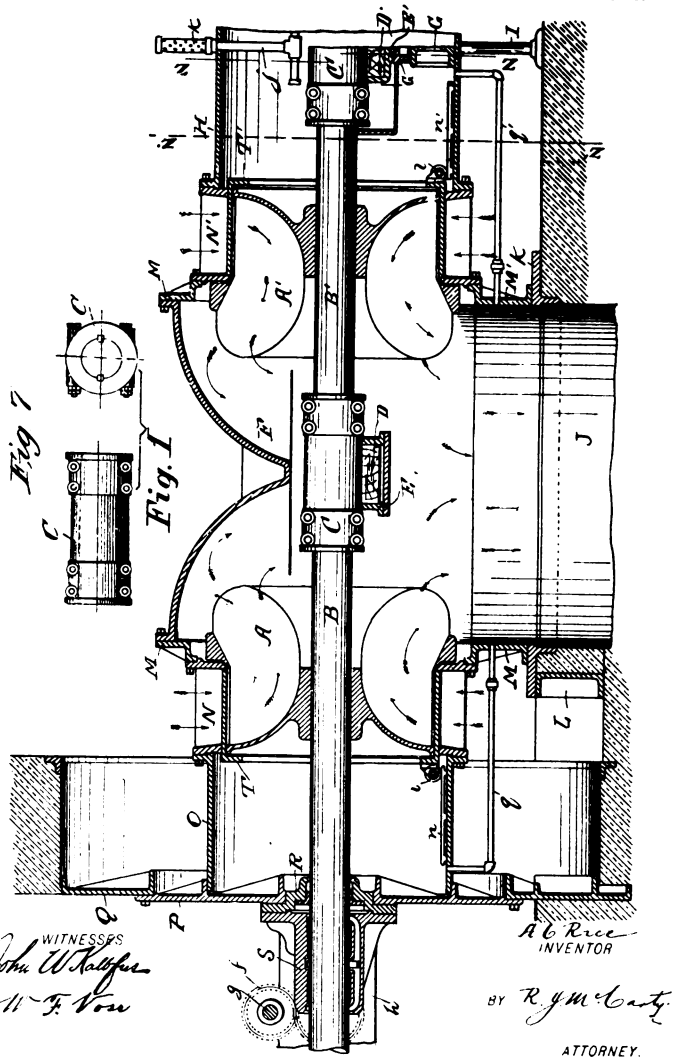
No. 621.141. Patented Mar. 14, 1899.

A. C. RICE.

WATER WHEEL SYSTEM.

(Application filed May 9, 1898.)

(No Model.) 4 Sheets—Sheet 1



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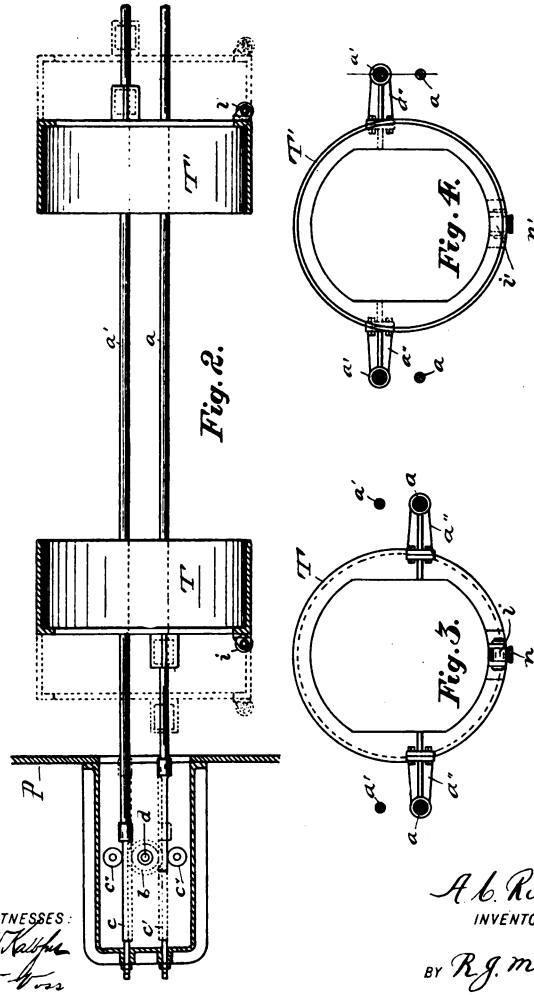
No. 621,141. Patented Mar. 14, 1899.

A. C. RICE.

WATER WHEEL SYSTEM.

(Application filed May 9, 1898.)

(No Model.) 4 Sheets—Sheet 3



WITNESSES:

John W. Kalbfus

W. F. Voss

A. C. Rice

INVENTOR

BY R. J. McCarty

ATTORNEY

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No 621,141. Patented Mar. 14, 1899.

A. C. RICE.

WATER WHEEL SYSTEM.

(Application filed May 9, 1898.)

(No Model.) 4 Sheets—Sheet 4

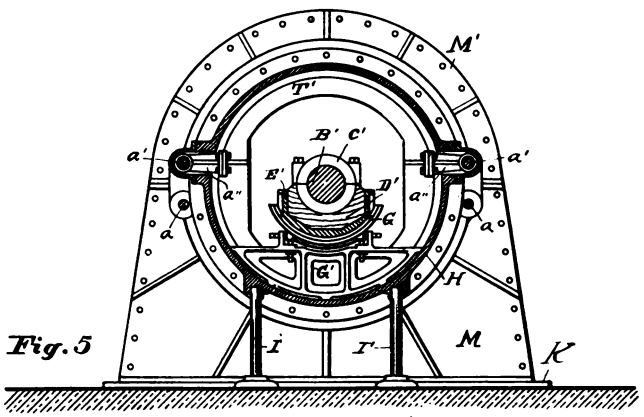

Fig. 5

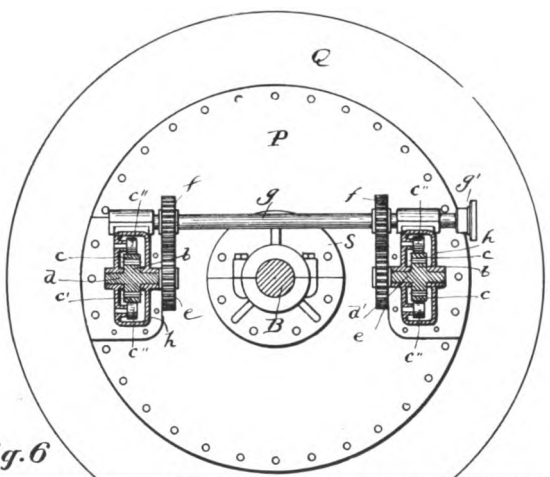

Fig. 6

WITNESSES.

John W. Wallace

W. F. Von

INVENTOR

A. C. Rice

BY R. J. McCarty

ATTORNEY

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These parts, united and projected into the flume-head in the compact manner shown, enable, as before stated, a great economizing of space necessary for setting the Wheels. The shaft takes none of the weight of the wheel-casing and is free from all weight except that which is due to the action of the water on the Wheels. In order to keep the dome-cylinders H O free from water and prevent water from coming in contact with the oil-bearings, I provide drain-pipes q q' tapped into said cylinders and discharging into the draft-tube J, the suction created by the discharge water from the wheels tending to draw the water out of the said cylinders. The sleeve coupling and journal C is lubricated by the discharge of water from the Wheels, and journal C′ is likewise lubricated by water-piping c, which is provided with a strainer k. The several bearings S, C, and C′, owing to their construction and location, insure a perfect alignment of the wheel-shafting with the chute-cases. The gates T T′ are operated by parallel gate-rods a a', the former of which actuates the gate T and the latter rod operating in connection with gate T′. These rods are secured to their respective gates by means of arms a'', that project laterally from opposite sides of the gates, and are operated to shift the gates in opposite directions, as shown in Fig. 2, by spur-pinions b b', that engage with racks c c' on the ends of said rods. The outer sides of the racks engage with guide rollers c''. On shafts d d' of the pinions b b' there are also mounted spur-gears e e', that engage with similar gears $f f'$, secured to a transverse shaft g, the latter being journaled on housings h h', bolted to the flume-head cover P. The housings h h' also receive the journals for shafts d d' and rollers c'', i i' designate rollers mounted on the gates and resting on tracks n n', secured to the cylinders H O. These rollers take the weight of the gates, and thereby relieve the gate-operating rods of the strain due from said weight. The movement is imparted to the rods by turning the transverse shaft g by hand-wheel g' or in any manner. The pinions b b', engaging with the racks of said rods on each side of the gates, will when moved actuate the said rods in opposite directions to simultaneously move the gates. By thus locating the gate-operating mechanism on the outside of the flume-head cover **the working parts are free from contact with water, are easily adjusted, operated and lubricated, and all the mechanism can be taken off and repaired without drawing the water from the flume.**

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These various improvements are covered and secured to us by the following claims in said patent, viz:

1. In a Water Wheel, the combination with two or more Water Wheels and a sectional shaft upon which said Wheels are mounted, of sleeve-couplings uniting said sections of the shaft and forming the journals thereof, bearings in which said journals run, the said bearings being inclosed in the wheel-casing and forming water-bearings between the Wheels, substantially as described.

2. In a Water Wheel, the combination with Turbine Wheels A and A', and a sectional shaft upon which said Wheels are mounted, of a sleeve-coupling uniting said sections to form a continuous shaft, the said coupling consisting of two parts and forming the journal of said shaft, a bearing in which said journal runs, said bearing being inclosed in a casing, said casing being supported from the draft-chamber casing F, a shoe G, and provision carried by said shoe for supporting an end of the sectional shaft, substantially as described.

3. In a horizontal Water Wheel, the combination with the wheel-casing, a flume-head and cover, a sectional shaft, two or more Wheels on said shaft, and cylinder-gates controlling said Wheels, of longitudinally-movable rods connected to each side of said gates, racks connected to said rods and projected through the flume-head cover, and pinions mounted on said flume-head cover and engaging with said racks, and means for simultaneously actuating said pinions to move said rods, substantially as described.

4. In a horizontal Water Wheel, the combination with the wheel-casing, a flume-head and cover to the latter of which the said casing is connected, of cylinder-gates, arms projecting from opposite sides of said gates, longitudinally-movable rods connected to said arms, racks and pinions mounted on the outside of the flume-head cover, and means for relieving said rods of the weight of the gates, substantially as described.

5. In a Water Wheel system, the combination with a flume-head and a flume-head cover, of dome-cylinders one of which is sustained by a rigid connection with said flume-head cover, chute-cases connected to said dome-cylinders, one or more draft-chamber casings, a sectional Water Wheel shaft, and sleeve-couplings uniting the sections of said shaft and forming the journals thereof, substantially as specified.

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The great practical value of these inventions will become apparent to all who will give them careful consideration.

Modern engineering, especially in the driving of electric generators and other rapid-running machinery, imposes new and very difficult conditions upon the designers and builders of Water Wheels. In the case of electric generators, for example, these require a large power and a high speed. In view of these requirements a direct connection to the turbine-shaft is preferred wherever it is possible to have it, because such direct connection avoids all possible loss of power through transmission appliances. These conditions frequently necessitate the grouping of several Turbine Wheels in order to form what is known as a "unit" of power suited for the purpose in hand. To illustrate: Suppose the electric generator requires one thousand horse-power and a speed of three hundred revolutions per minute. Now with forty feet head these results could be obtained with a pair of thirty-inch wheels of the type shown. But suppose the same requirements of power and speed are required with a head of only thirty feet. This would call for two pairs of twenty-seven-inch Wheels. Or, again, if the head was only twenty-five feet, to obtain the requisite power and speed under that head would necessitate three pairs and one single Wheel of the twenty-four-inch type, all connected on one horizontal shaft and forming a unit. The construction shown in the drawings permits of shortening up the space that would be occupied by these several pairs of Wheels, **thus greatly reducing the cost of the power-house or structure in which the Wheels are placed.**

Heretofore for actuating the speed-gates of Turbine Wheels use has been made of racks and pinions situated on the inside of the Water Wheel casing. These gears were thus placed out of sight in a place difficult of access, and, furthermore, are subject to very rapid wear because of the constant working in water which contains more or less grit. **By the arrangement of the gate-operating mechanism herein shown and described, all of said mechanism is placed on the outside, where it is not only accessible, but is in plain view of the operator, and its working parts instead of grinding in water can be operated in a bath of oil.**

WE REGRET TO NOTE A DISPOSITION TO INFRINGE THESE PATENTS, AND WE WISH TO SERVE NOTICE UPON BOTH MANUFACTURERS AND USERS OF INFRINGING DEVICES, THAT WE SHALL VIGOROUSLY PROTECT OUR RIGHTS.

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PAIR OF TWELVE-INCH VICTOR TURBINES ON HORIZONTAL SHAFT.

[The same plan may be used for Wheels of any size.]

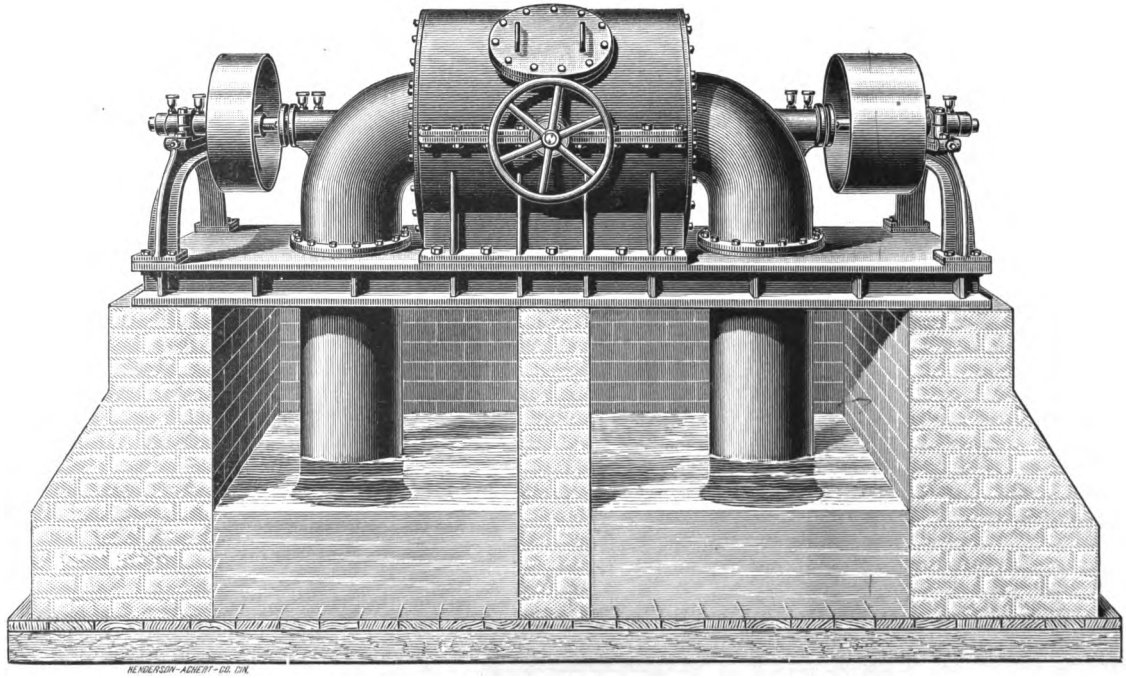

FIG. 10—Front View. *(See opposite page also.)*

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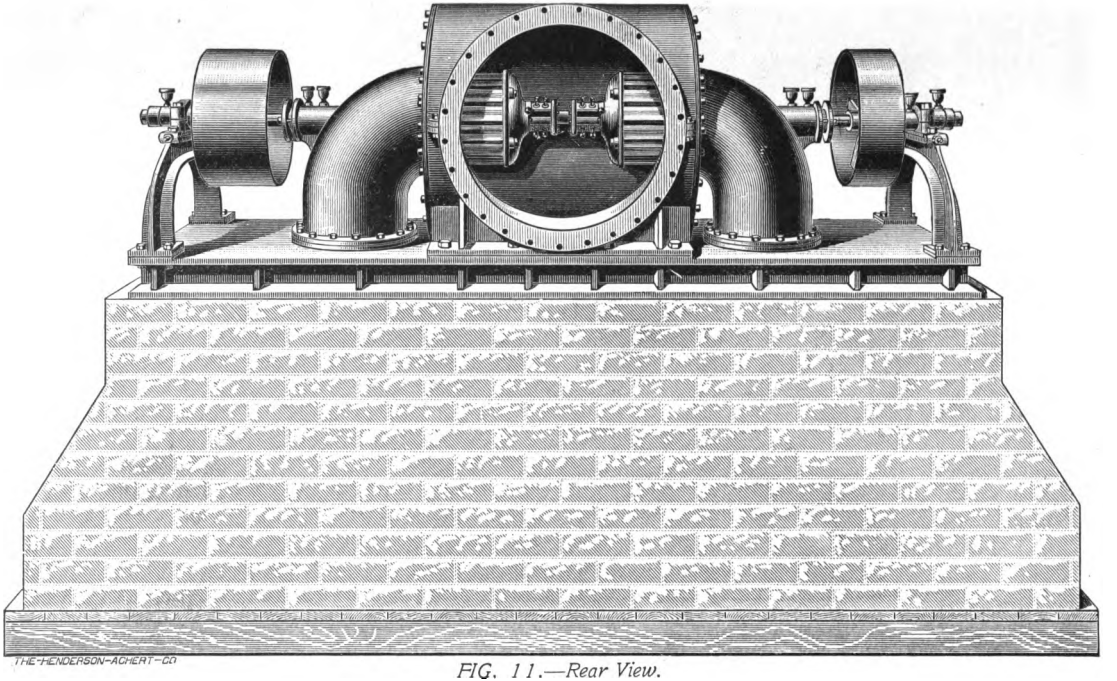

FIG. 11.—Rear View.

The accompanying engraving represents a pair of 12-inch VICTOR TURBINES arranged on a Horizontal Shaft, with Cast-Iron Flume, Draft Tubes, End Bearings for Shaft, and Driving Pulleys, complete, all mounted upon a substantial Cast-Iron Bed Plate. The entire arrangement is very complete, and strictly first-class in every particular. The pair of Turbines from which these engravings were made were furnished to an Electric Light Co., and operate under 46 feet head.

Prices quoted on receipt of specifications.

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PAIR OF THIRTY-INCH VICTOR TURBINES

Arranged in One Flume on Horizontal Shaft.

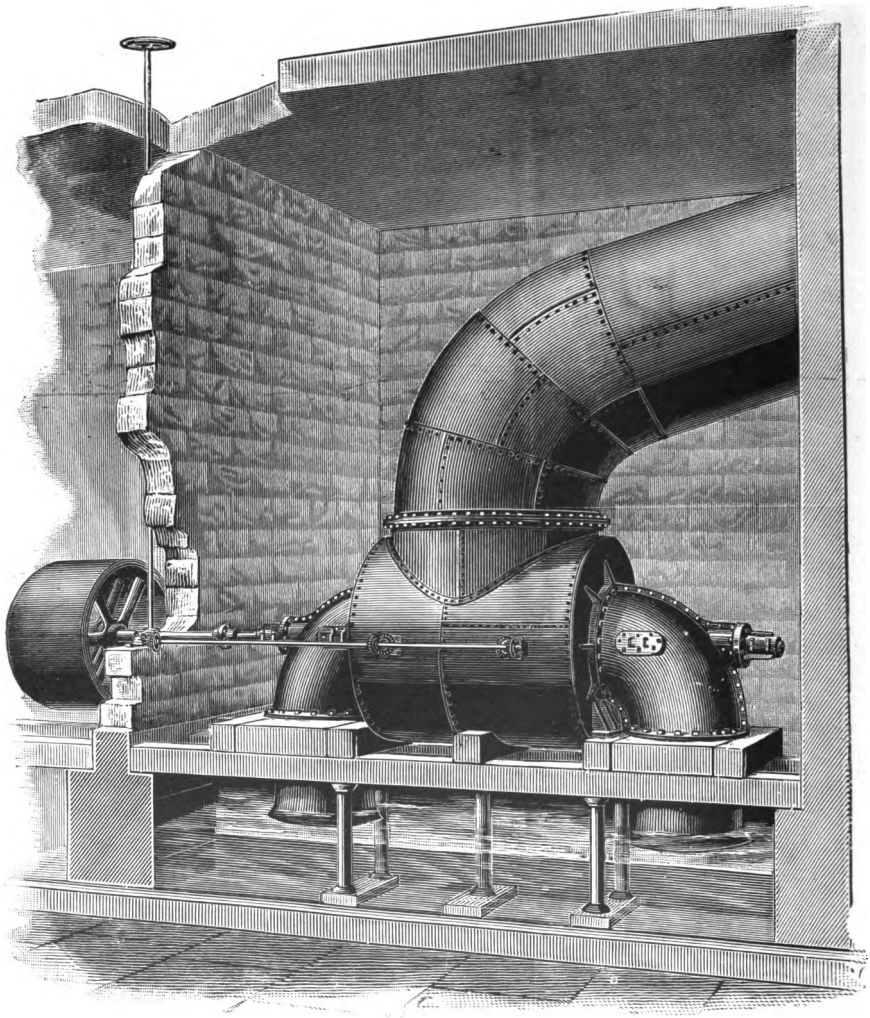

FIG. 12. *(For description see opposite page.)*

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THE pair of 30-inch Turbines illustrated on the opposite page were designed and erected for The Cowles Electric Smelting and Aluminum Co., Lockport, N. Y. They are placed under 35 feet head, develop 528 horse power, and are used for driving a large dynamo. We append a letter from B. Holly, the emiment hydraulic engineer, who planned the works, but the most convincing evidence of satisfactory results is found in the fact that we have since furnished them an additional pair of same design, and one single Turbine on horizontal shaft. We have made many improvements since this plant was installed, but we continue to illustrate it and to print the accompanying letter from Mr. Holly **in proof of our claim that we were the first to install a practical and satisfactory horizontal Turbine plant.**

LOCKPORT, N. Y , Sept. 28, 1886.

Stilwell & Bierce Mfg. Co., Dayton, Ohio:

SIRS—Yours of the 24th inst. is at hand. The pair of 36-inch Wheels on horizontal shaft you furnished The Cowles Smelting and Aluminum Co., of this city, are now in operation and handle the great ten-ton dynamo with perfect ease. Your Wheels are placed on the floor of the wheel house, 30 x 96 feet, in plain sight. If they were not in sight, I could not tell from any jar or noise whether they were running or not. We have carried out your suggestions in regard to the waterways as nearly as possible, and they are right. The water is conveyed from the bulkhead to the Wheels through an iron tube 8 feet in diameter. The tail race has a width of 30 feet, and is 8 feet deep when the Wheels are not running and not perceptibly higher when they are running. I have had large experience in the manufacture and use of Turbine Wheels, and should be able to judge in regard to the character of the work. I find the general design and proportion of the different parts are such as to insure the greatest strength and durability. They so nearly meet my views as to make it impossible for me to point out the parts that will first need repairs.

In regard to the quality of the work, I can safely say that it is the best Water Wheel work that I have ever looked at. Every part of the work, from the drawings to the millwrighting, must have been done by first-class mechanics.

I would like very much to see these last Wheels tested, for I am satisfied they would give very high duty.

Truly yours,

B. HOLLY.

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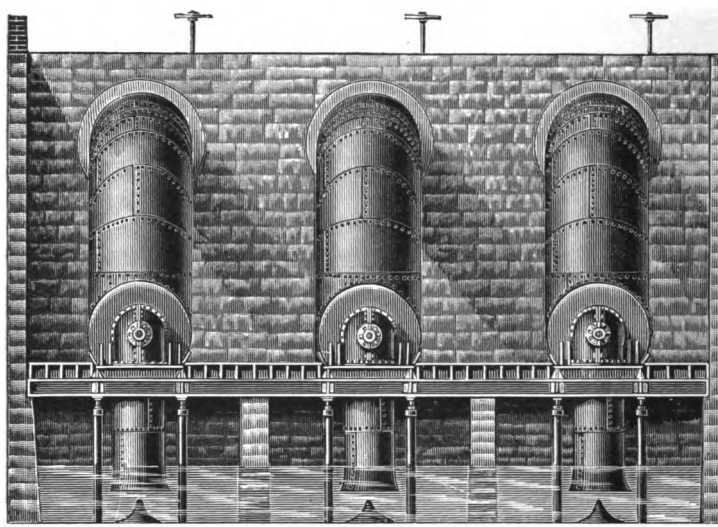

FIG. 13.—(See opposite page also.)

ENGRAVINGS 13 and 14 show three pairs of 35-inch Victor Turbines on horizontal shafts designed for service under 40 feet head, to develop an aggregate of about 2,800 horse-power. Each pair of Wheels develops 930 horse-power, and is placed in a separate flume, with supply pipe and draft tubes, as shown in the side elevation on opposite page, so that either pair, or all of them, can be operated as desired. The entire plant is of the most substantial and permanent character.

Each pair of these Wheels was designed to drive a row of wood-pulp grinders placed on an extension of the water-wheel shaft, thus dispensing with all gearing.

The same arrangement of Turbines, or a modification of it, can be adapted to a great variety of situations and purposes.

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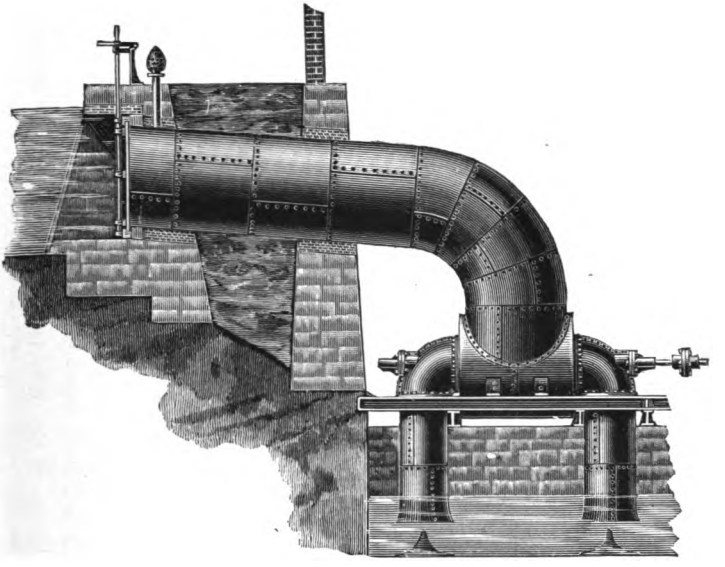

FIG. 14.—(See opposite page also.)

INVESTIGATION will reveal the fact that we have furnished **more original designs for work in this line,** to meet the special requirements of the situation, than all the other manufacturers of Turbines in this country combined, and our facilities for turning out work of this character are unequaled.

We keep a corps of competent engineers to personally inspect water powers and make plans for their most profitable development.

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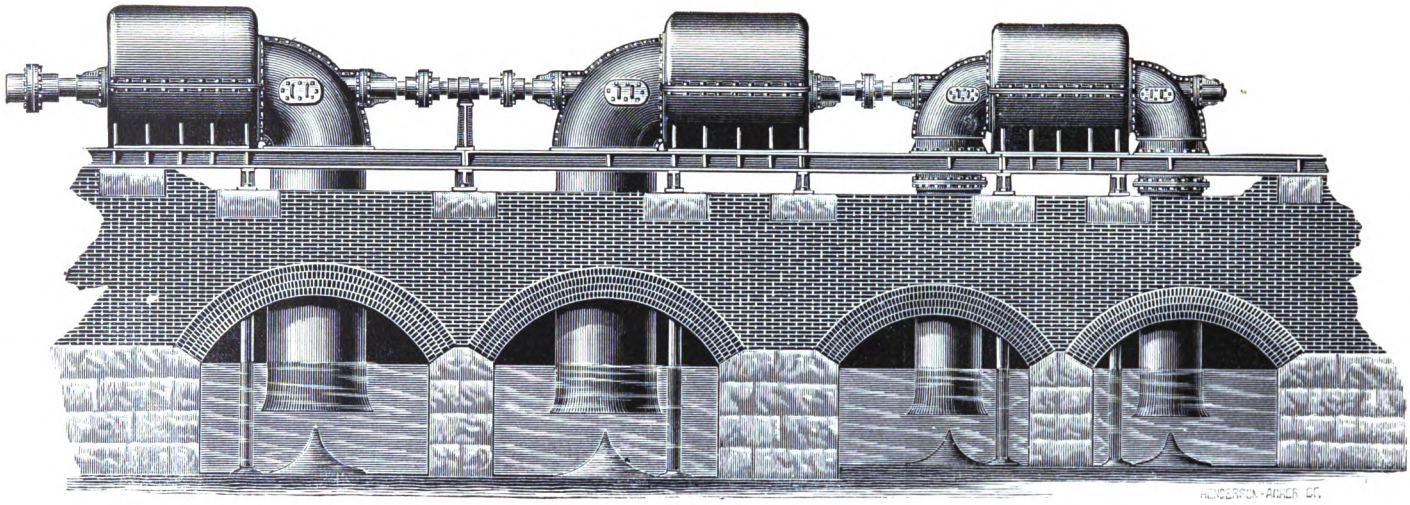

FIG. 15.

THE above arrangement, Fig. 15, of four Victor Turbines on horizontal shafts, was designed for a particular site, affording 2,000 horse-power, the water being drawn from two canals at different levels, all the Wheels discharging into one tail race. The plant comprises one pair of 30-inch Victor Turbines in one flume (shown at the right-hand end of the engraving, to operate under 27.6 feet head, developing about 400 horse-power at 214 revolutions per minute; and two single 40-inch Victor Turbines in iron flumes, discharging in opposite directions, operating under 48.7 feet head, developing 800 horse-power each (making an aggregate of 2,000 horse-power) and 214 revolutions per minute. The power of the Wheels is to be transmitted by means of pulleys and belts on an extension of the shaft, not shown in the engraving. This plant is submitted as an ideal plant in point of simplicity, strength and permanency.

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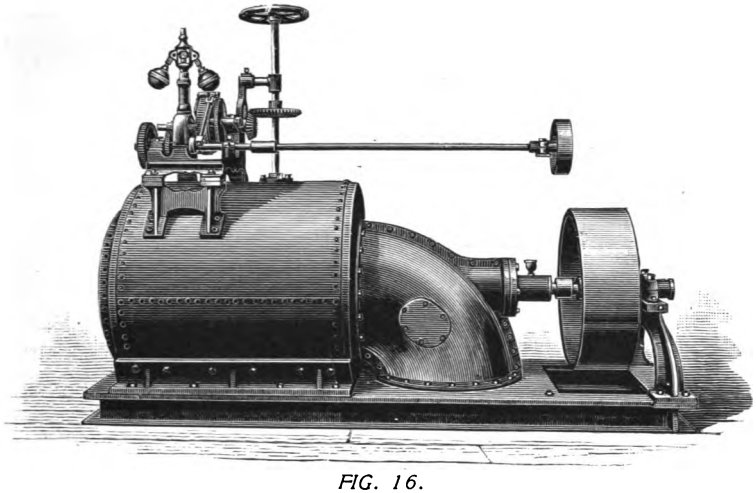

FIG. 16.

THE above engraving represents a Single Victor Turbine on horizontal shaft, with flume, driving pulley and outer bearing all placed upon a cast-iron bed plate in the most complete and substantial manner ready to attach the supply pipe and draft tube. (For larger Turbines wrought-iron beams are substituted for cast-iron bed plate.) In the engraving, the supply pipe is designed to be attached to one end of the flume, but it can be arranged to attach to either side of the flume if preferred, closing the end with an iron head. A governor for regulating the speed of the Wheel is shown mounted on the top of the flume, and is recommended as a most complete and satisfactory arrangement.

MINNEAPOLIS, MINN., May 18, 1889.

Stilwell & Bierce Mfg. Co., Dayton, Ohio:

GENTLEMEN—Messrs. C. A. Pillsbury & Co. have requested me to write you with reference to the 25-inch Horizontal Victor Turbine and appurtenances which you furnished for their new wheat elevator and cleaning house, situated on Sixth avenue S. and the Mill Co.'s canal, in this city. This Turbine has been fully tested, and has given good satisfaction since it first started. The workmanship and construction are excellent, and in every way superior to any other make or style of Water Wheel in use in this city. It has run with perfect ease and steady motion under trying circumstances, both under high and low heads of water, and there has never been a failure or trouble of any kind; and I will only add that Messrs. C. A. Pillsbury & Co., and every one else who has watched its performance, are well pleased with it. On behalf of the Water Power Co., I would say that we are anxious to see this style and make of Water Wheel universally adopted by our local millers and manufacturers. Very respectfully yours, W. DE LA BARRE,

Engineer and Agent Minn. Mills Co.

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THE VICTOR TURBINE ON HORIZONTAL SHAFTS.

Adapted to the Requirements of a Peculiar Situation.

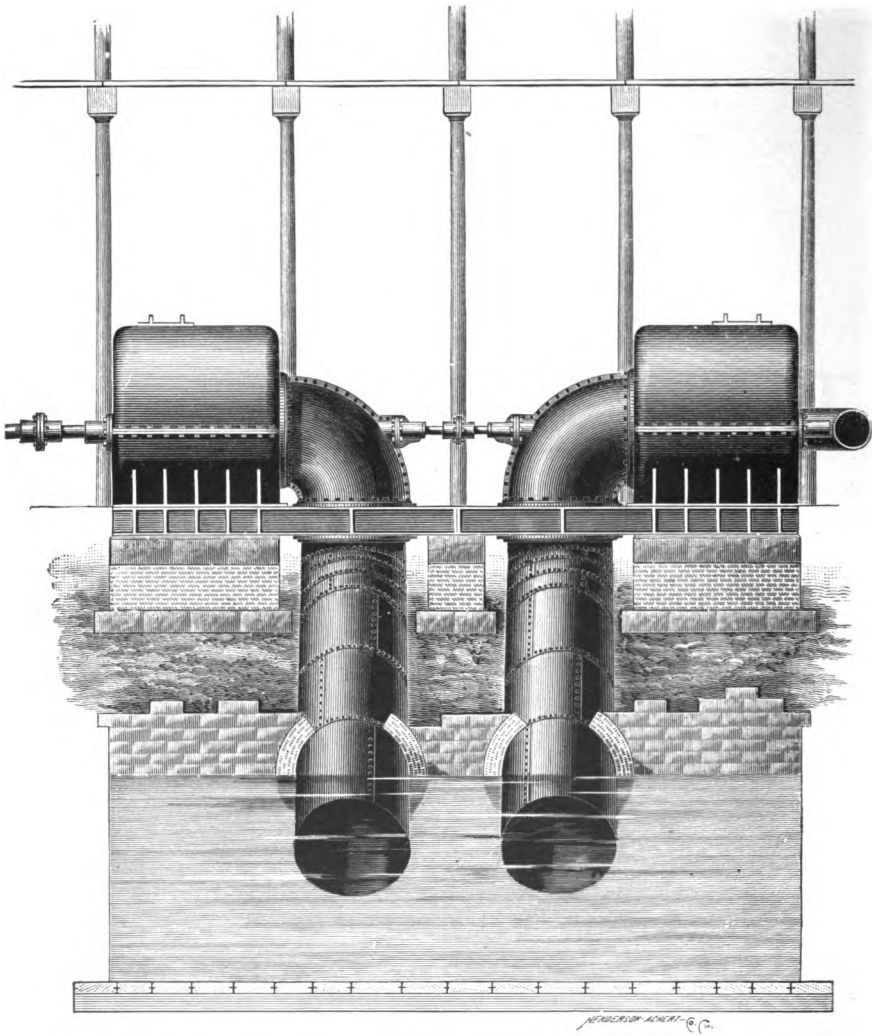

FIG. 17.

Another view of this plant is given on opposite page.

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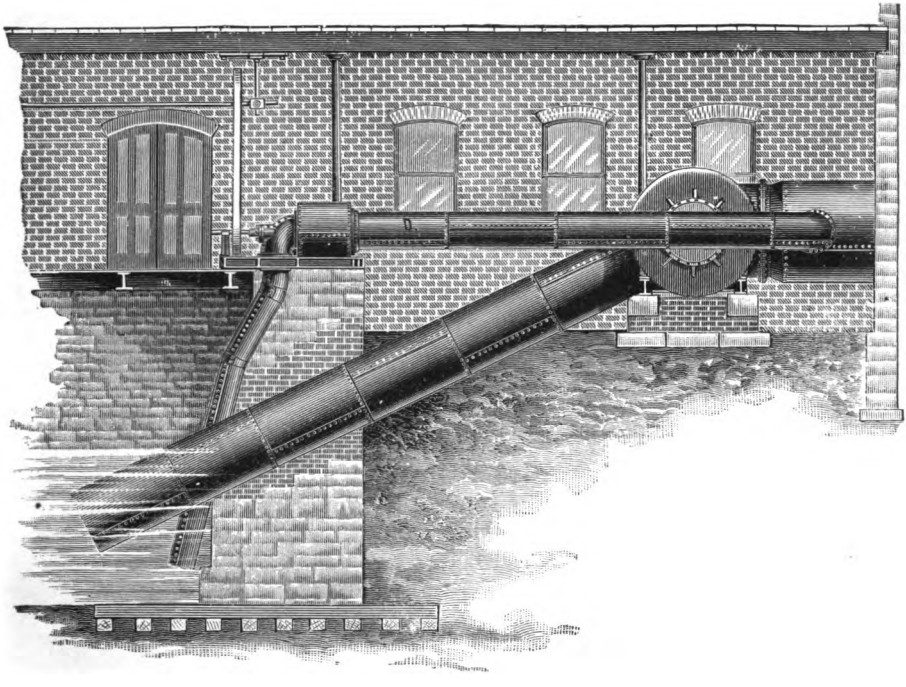

FIG. 18. (See opposite page also.)

THE accompanying engravings represent a plant furnished by us for one of the cotton mills of the Washington Mills Company, Lawrence, Mass. It consists of two 40-inch Victor Turbines on horizontal shafts, in independent flumes, but connected together, as shown, operating under 25 feet fall and developing 600 horse-power, and one 15-inch Wheel, under the same fall, developing 48 horse-power. The two 40-inch Wheels are used for driving spindles and weaving machinery, and the 15-inch Wheel for driving an electric light plant and the repair shop.

This pair of Victor Turbines displaced a very large Boyden Turbine, but the wheel pit was prepared for a large Breast Wheel that originally furnished power for the mill. This arrangement of Turbines and draft-tubes, as shown, located the power just where it was wanted for convenience and economy in transmission, and avoided the great expense and trouble of making a new wheel pit.

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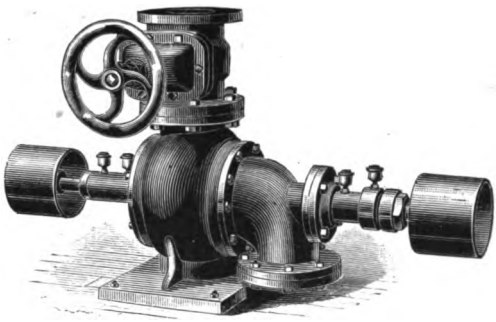

FIG. 19.

TO MEET the demand for a small Turbine adapted to high falls and light streams, we have designed a 5-inch special Victor Turbine on horizontal shaft, with flume, which is illustrated in the above engraving (Fig. 19).

The Wheel is made of gun metal; the shaft of steel; the flume of cast-iron; the bearings of the best anti-friction metal; the whole being of the most simple and substantial character. A valve in the supply pipe is used for regulating the supply of water, instead of our regular register gate, owing to the great pressure incident to high falls. The engraving represents the Wheel and flume complete, ready to attach the supply and discharge pipes. The supply pipe is six inches, and the discharge pipe seven inches in diameter.

Further particulars on application.

Its Enormous Capacity in a Small Diameter,

High Percentage of Useful Effect,

Simple, Strong Construction and Perfect Gate,

Give to

THE VICTOR TURBINE

A Combination of Excellencies not Found in any Other Wheel.

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VICTOR TURBINE ON HORIZONTAL SHAFT.

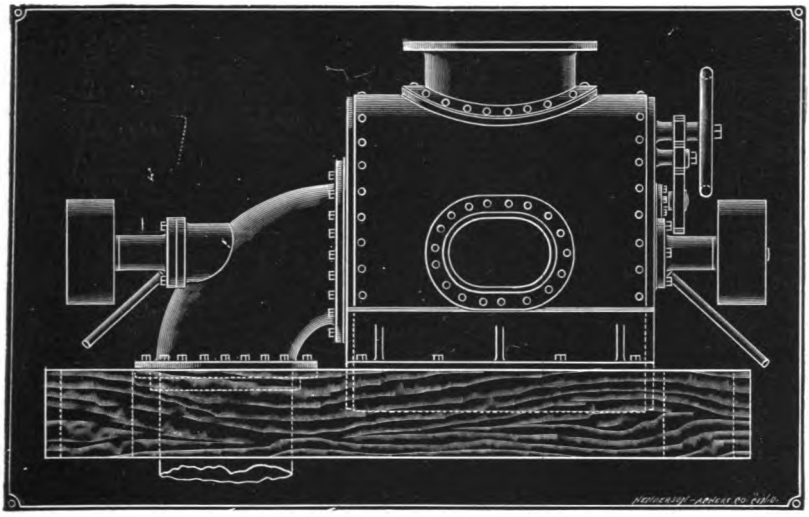

FIG. 20.

ABOVE we illustrate a very simple and compact arrangement of a single Wheel on horizontal shaft, with flume and draft tube complete, to be placed on timber foundations, with facilities for taking off the power at both ends of the shaft. The hand wheel and gears for operating the gate are placed outside of the flume in plain sight. In the engraving the connection with supply pipe is shown at the top of the flume, but can be placed at any point between the top and bottom of the flume to suit the location.

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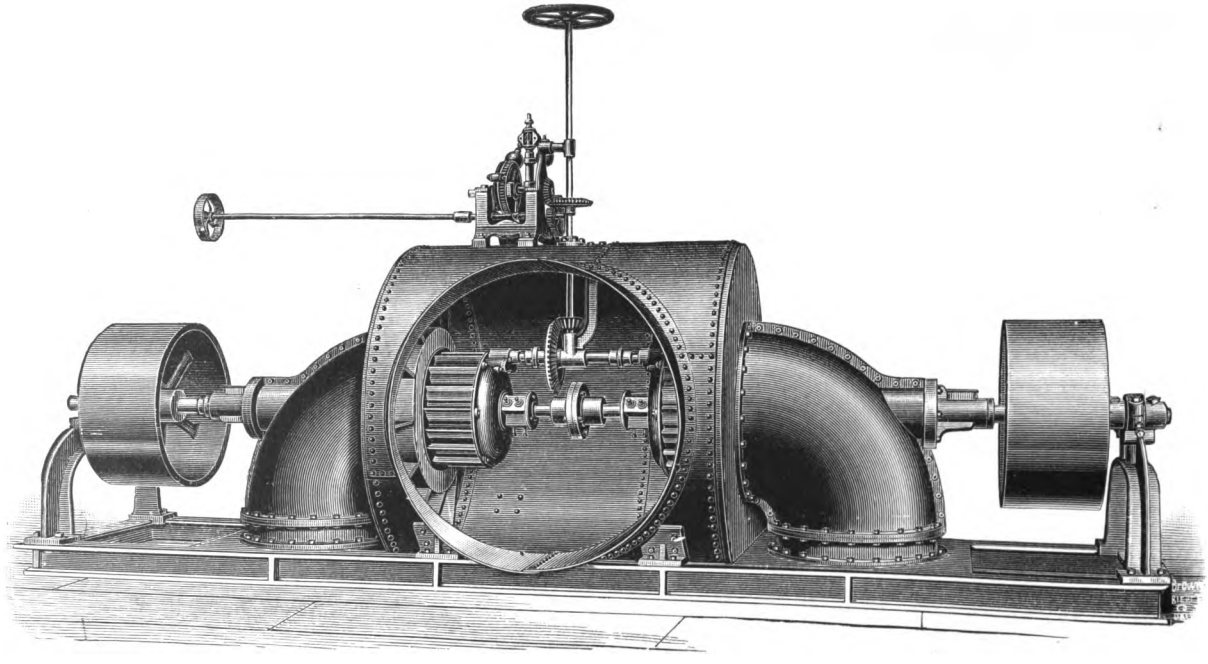

FIG. 21.

Fig. 21 represents a pair of small Wheels with cast-iron bed, driving pulleys and governor, complete. The details of the work are so clearly shown as to render further explanation unnecessary. For larger Wheels, wrought-iron beams are substituted for cast-iron bed plate. Wheels can be made to operate independently, as shown in Fig. 63, if desired.

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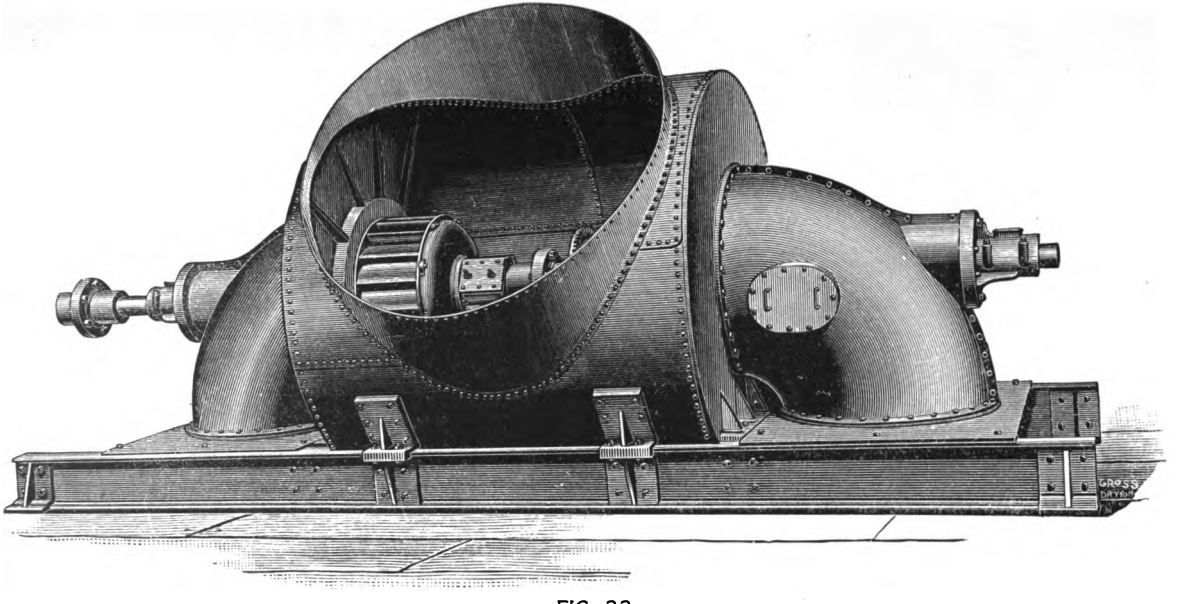

FIG. 22.

Fig. 22 represents our general style of mounting pairs of Wheels larger than 18-inch on horizontal shaft. The supply pipe may enter the flume at any angle, and such modifications of the design may be made as the peculiarities of the situation may require. Power may be taken off at either or both ends, and arrangements can be made to use either or both Wheels at pleasure. We have placed a large number of such plants under a great variety of conditions, and always with the most gratifying results.

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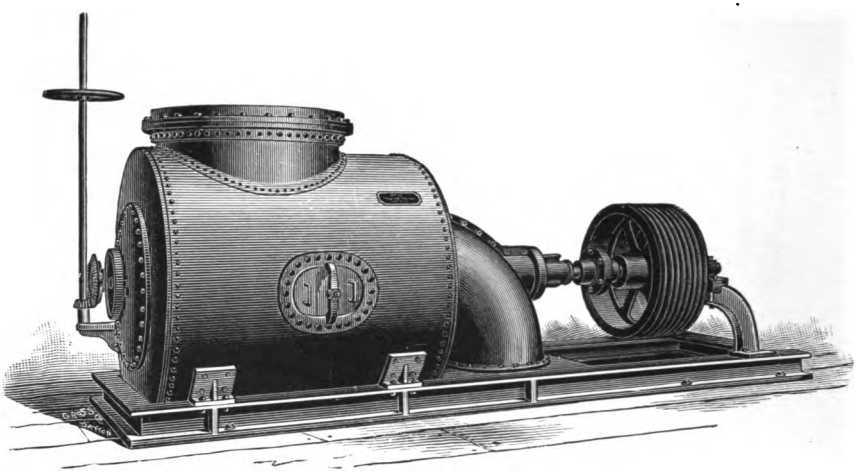

FIG. 23.

Fig. 23 represents a single 20-inch Horizontal Wheel, with a grooved pulley for rope transmission, placed UNDER NINETY FEET HEAD, in the mill of J. G. Davis & Co., Rochester, N. Y. The situation is a most difficult one, and required engineering ability of the highest order to satisfactorily meet the demands. With what success we accomplished this will appear from the following letter:

ROCHESTER, N. Y., May 17, 1886.

Stilwell & Bierce Mfg. Co.. Dayton, Ohio:

GENTS—We are in receipt of your favor of the 14th inst., and take pleasure in saying the Horizontal Turbine Wheel case and attachments you placed in our new mill some ten months since, and under a head of 90 feet, is giving us the greatest satisfaction. With ⅝ gate we run 500 barrels in twenty-four hours. The throwing in or out of our cleaning machinery with friction clutch, starting 50-light dynamo, or freight elevator with a half-ton load, is scarcely Perceptible on the motion indicator. We also desire to say the rope transmission from Wheel to main driving line is highly satisfactory.

Yours Truly, J. G. DAVIS & CO.

NOTE—These parties write us under date of Jan'y. 30, 1897, in regard to their Wheel: "Our work is almost constant 24 hours daily, six days per week without stopping EVERY WEEK SINCE IT STARTED except during low water periods, and we have always been well pleased with its operation." Such a record is conclusive evidence of the superiority of our work.

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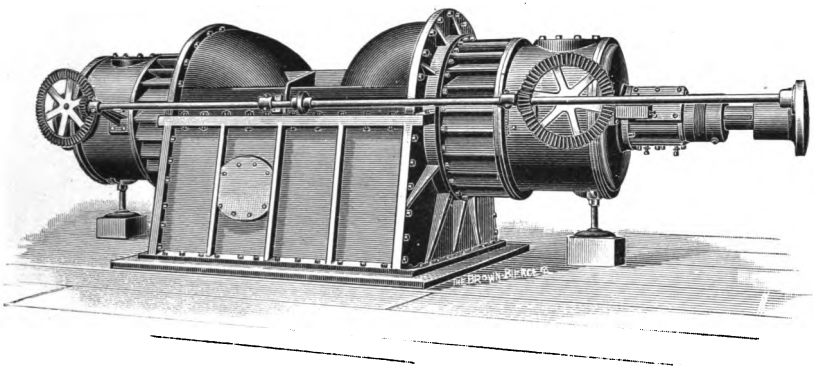

FIG. 24.

Fig. 24 represents a pair of Wheels on horizontal shaft, both Wheels seated upon and discharging into a cast-iron draft box, the whole placed in an open flume. The wheel-shafts extend each way through packing-boxes placed in the sides of the open flume.

Wheels of this design were furnished C. R. Remington & Son, Watertown, N. Y., a letter from whom is appended:

WATERTOWN, N. Y.

Stilwell & Bierce Mfg. Co., Dayton, Ohio:

GENTLEMEN—In reply to yours of recent date, we are pleased to say the two pairs of 30-inch Victor Wheels on horizontal shafts have been in use since September, 1888, and have given perfect satisfaction. They are running under 30 feet head, and we drive with each pair two three-pocket hydraulic feed pulp grinders, 275 revolutions per minute, without gearing. Each grinder will turn out two tons per day, dry weight, of spruce pulp of good quality. We think each pair of wheels would drive an additional grinder.

Yours truly,

C. R. REMINGTON & SON.

Mr. Remington writes February 2, 1897: "The horizontal wheels placed in C. R. Remington & Son's Co.'s mill in 1888 and later, are running and giving perfect satisfaction."

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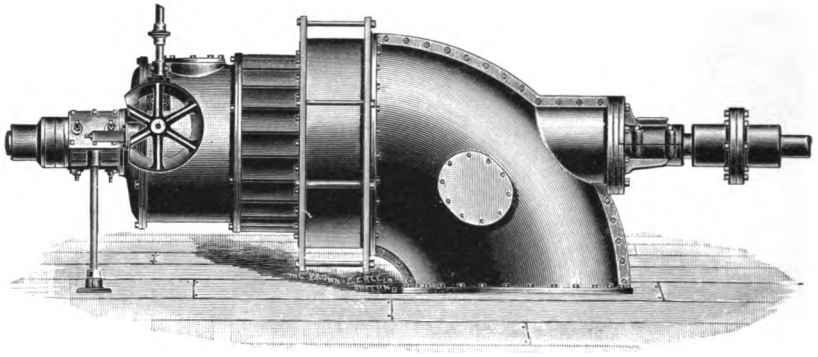

FIG. 25.

Fig. 25 represents a single Wheel on horizontal shaft, arranged for attaching to the side of an ordinary wood flume, the Quarter Turn coming outside the flume. This arrangement can frequently be used to advantage as a helper, to supply deficiency in power.

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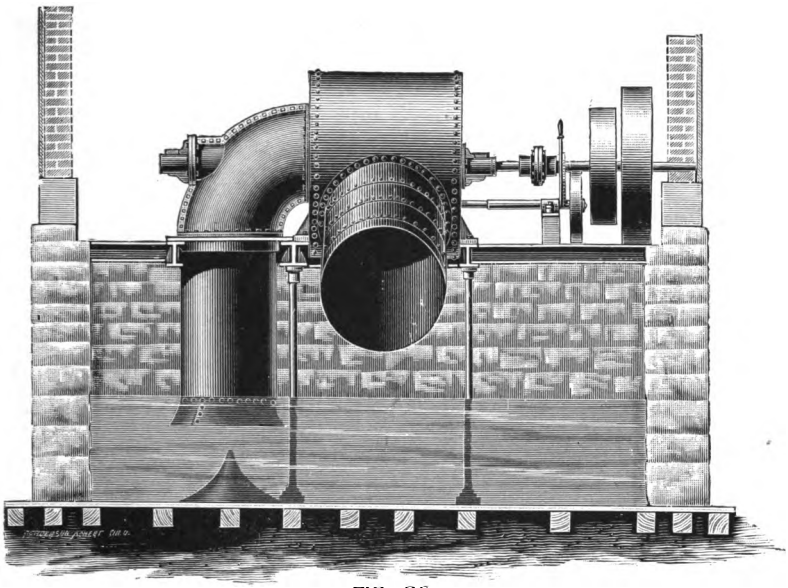

FIG. 26.

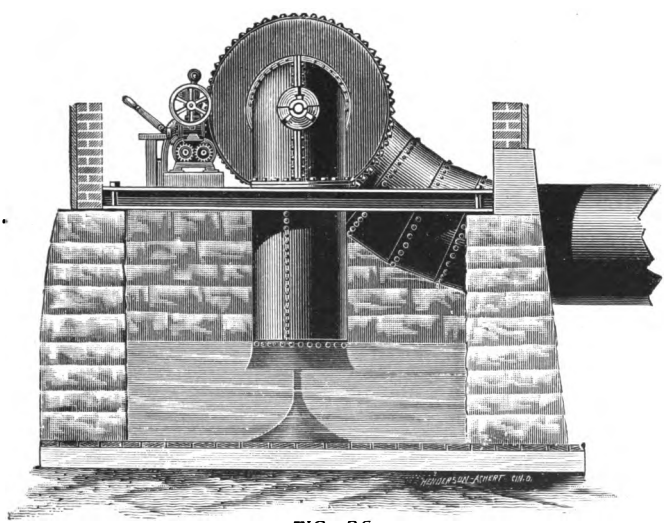

FIG. 26.

THE above engravings, Figs. 26, represent side and end elevations of a single 30-inch Victor on horizontal shaft, put in for The Hockanum Co., Rockville, Conn. It operates under 18 feet head, develops 100 horse-power, and is used for driving a woolen factory.

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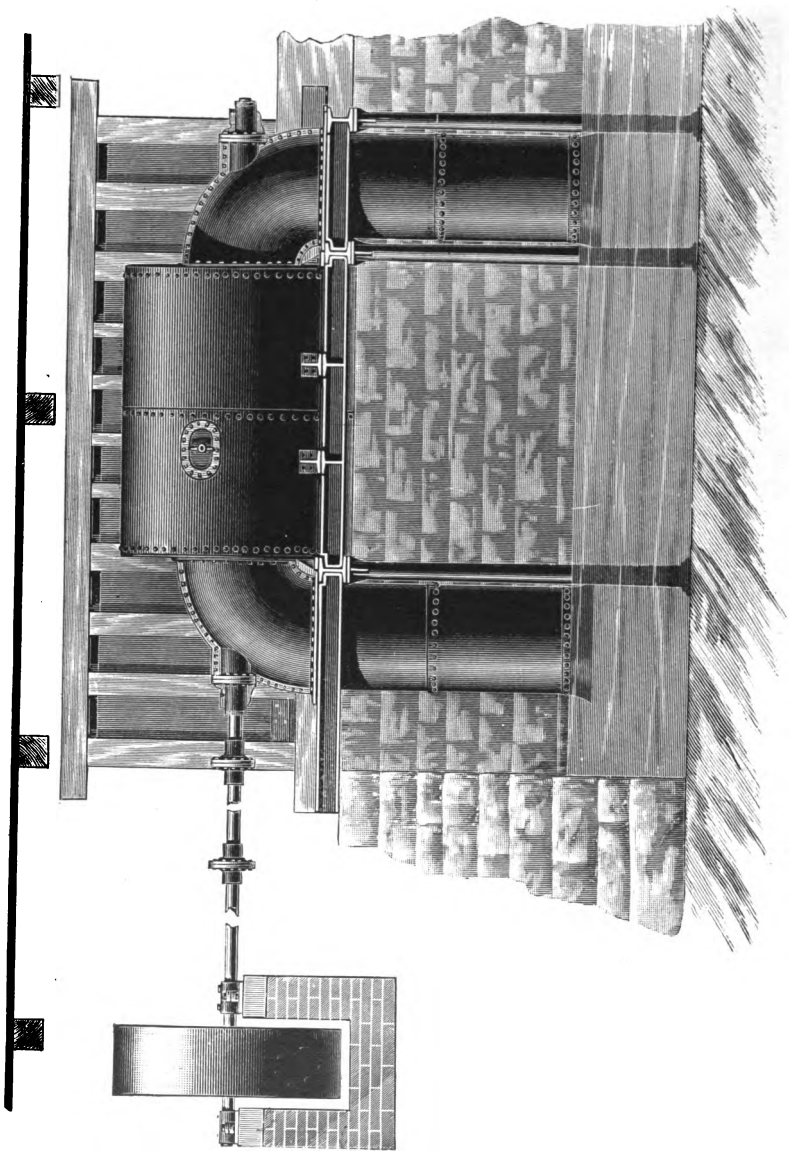

FIG. 27.

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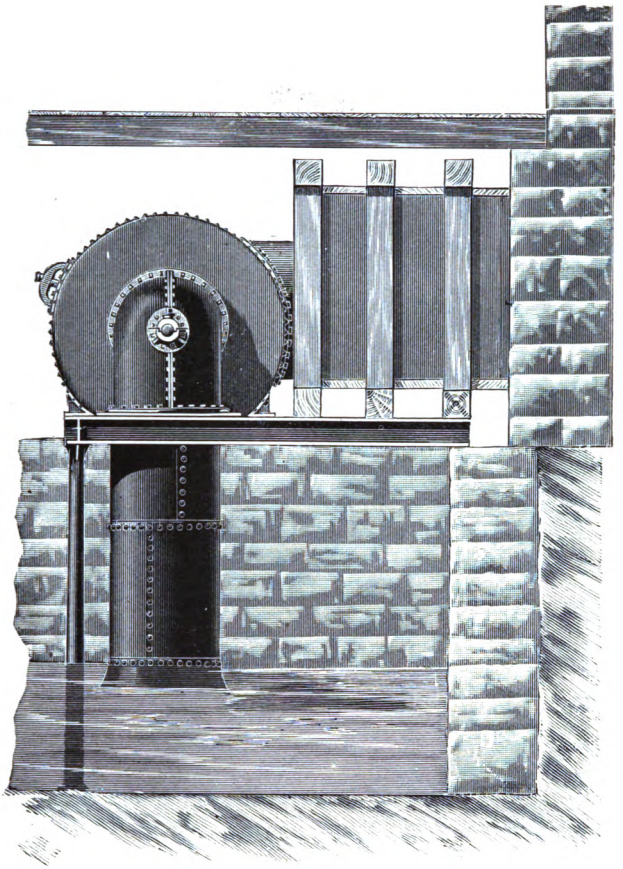

FIG. 28.

FIGS. 27 and 28, on this and the preceding page, represent side and end elevations of a pair of 35-inch Victor Turbines on horizontal shaft, put in the cotton mill of J. P. & E. K. Ray, at Woonsocket, R. I. They displaced a very large Breast Wheel, operate under 17 feet head, and develop 265 horse-power.

We append a letter from this firm:

WOONSOCKET, R. I., May 18, 1889.

Stilwell & Bierce Mfg. Co.:

GENTLEMEN—In reply to your favor of the 14th inst., we are pleased to say that the pair of 35-inch Victor Horizontal Wheels that have been running in our Ballou mill for about two years, have given excellent satisfaction, and we consider the quality of the work first-class in every respect. Yours respectfully, J. P. & E. K. RAY.

Per C. H. Gorton.

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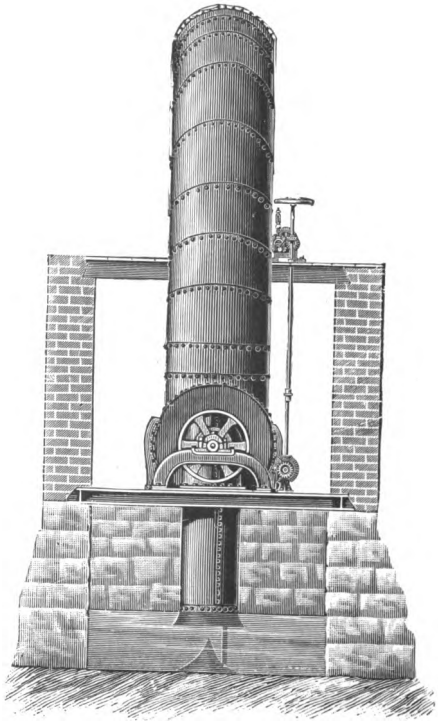

FIG. 29.

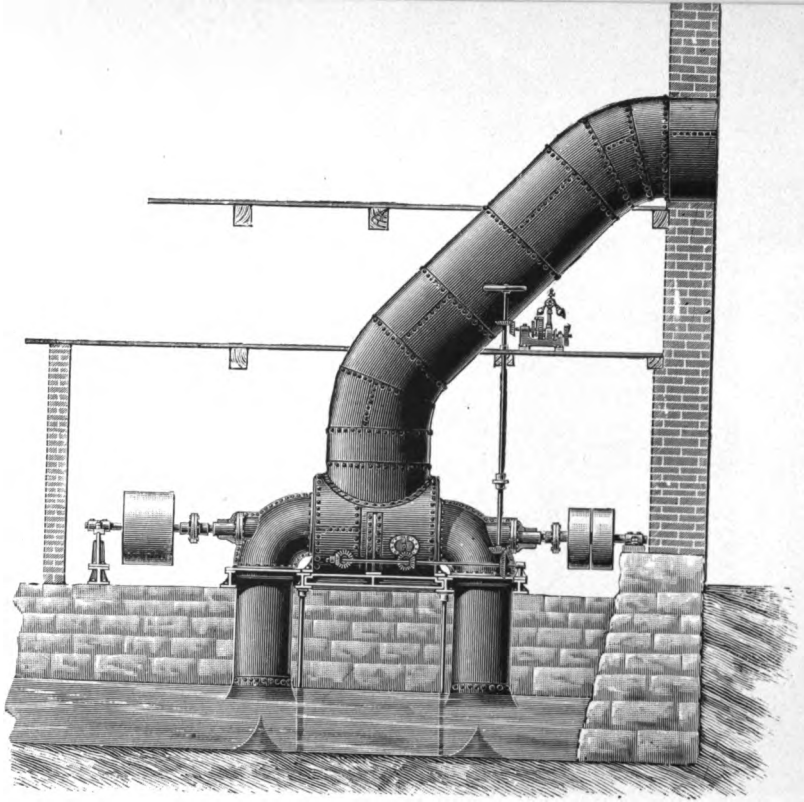

FIG. 29.

Figs. 29 represent side and end elevations of a pair of 25-inch Victor Turbines on horizontal shaft put in a cotton mill of The Methuen Co., Methuen, Mass. They displaced a very large Breast Wheel, operated under 38 feet head, and develop 400 horse-power.

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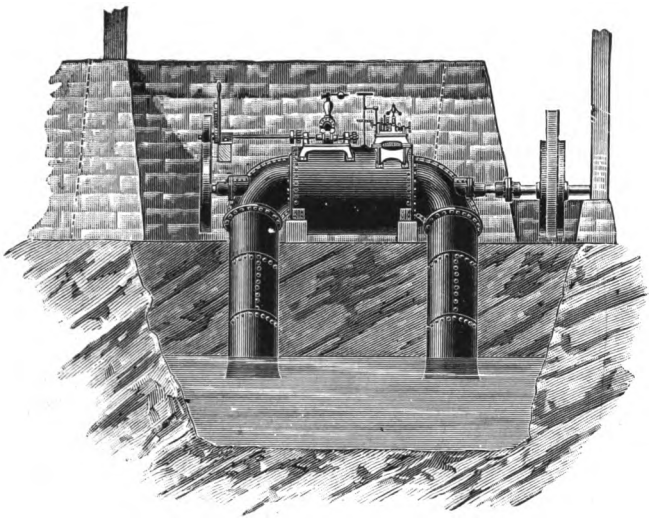

FIG. 30.

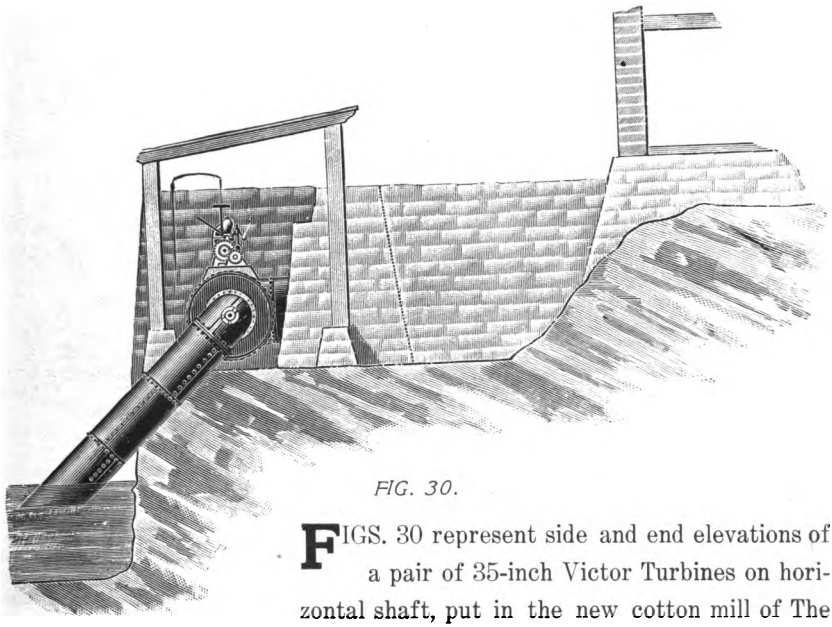

FIG. 30.

FIGS. 30 represent side and end elevations of a pair of 35-inch Victor Turbines on horizontal shaft, put in the new cotton mill of The **Henrietta Mills, Henrietta, N. C. They operate under 22 feet head, and are developing about 386 horse-power.**

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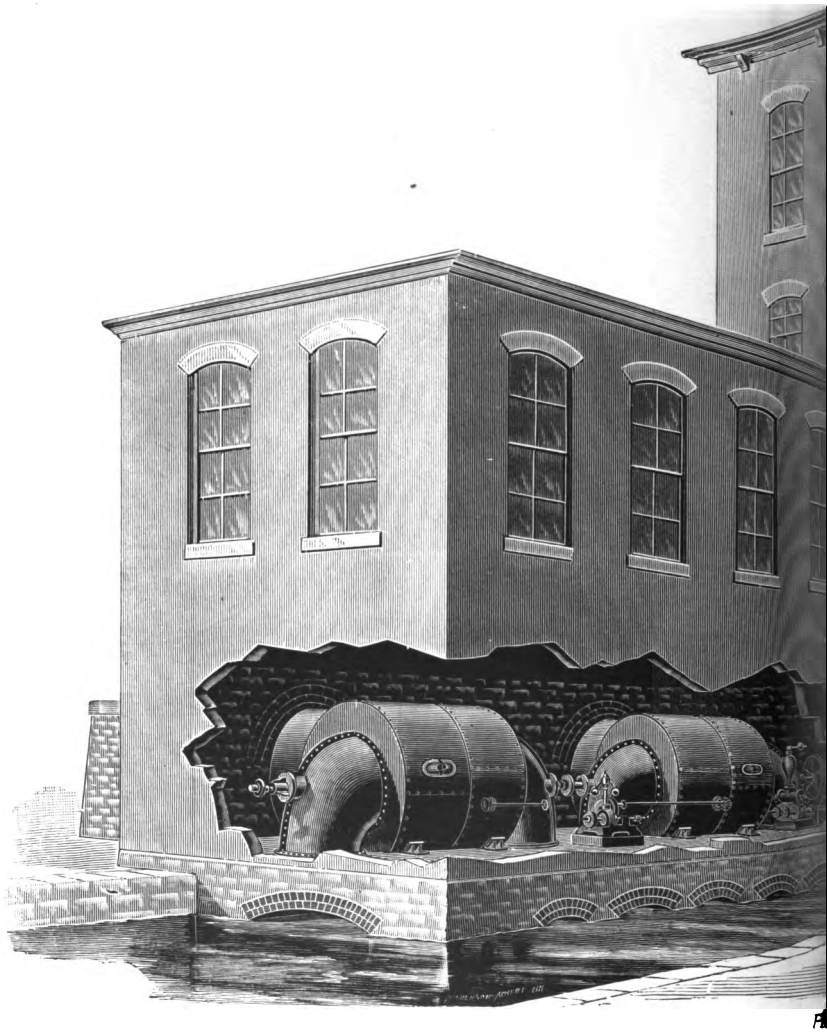

THE above engraving, Fig. 31, represents a portion of the new 24,000 spindle c for the Clifton Mfg. Co., Clifton, S. C. A portion of the wheel house is br Turbines on horizontal shaft, working under 18 feet head, and capable of developing They write us under date of February 2, 1897: "The 4-48" Victor Wheel plant yo —D. E. CONVERSE, President."

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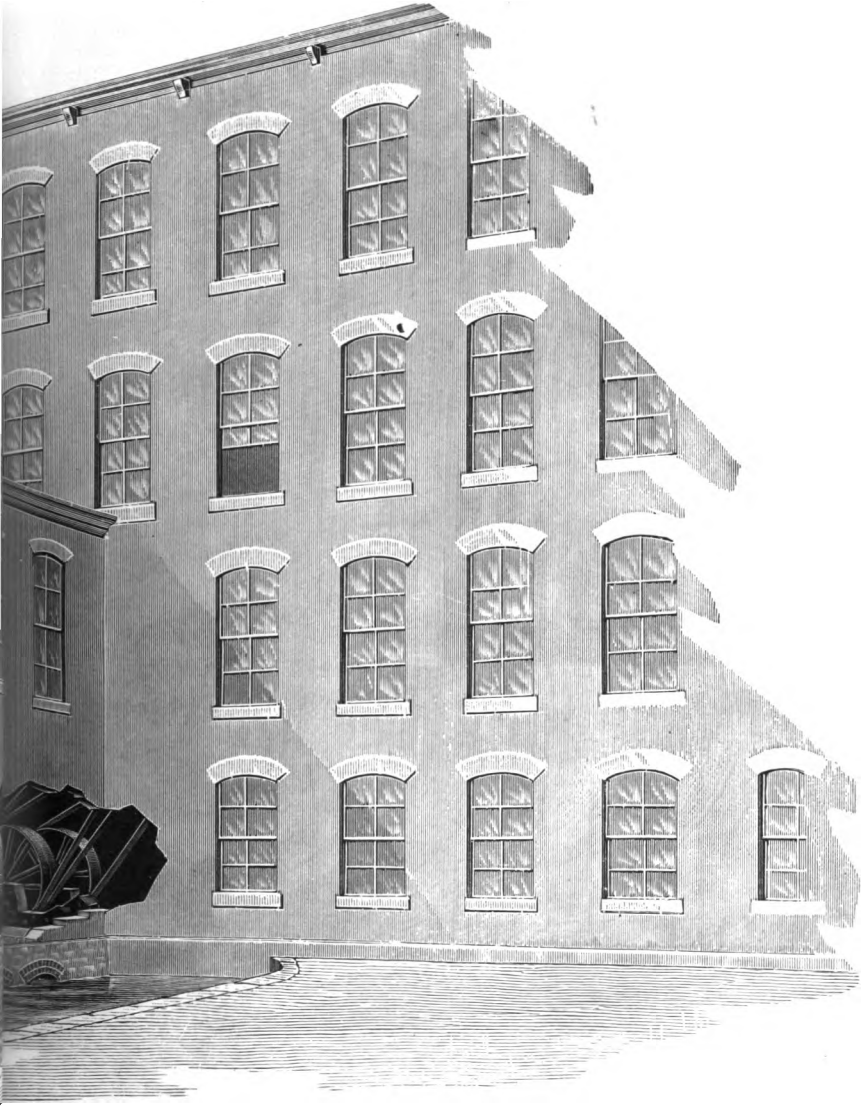

31.

on mill, designed by C. R. Makepeace & Co., Cotton Mill Engineers, Providence, R. I., n away to show the Water Wheel plant, which consists of two pairs of 48-inch Victor 080 horse-power. This entire plant is of the most modern and substantial character. placed in our Cotton Mill No. 2 in 1888, is still running and giving perfect satisfaction.

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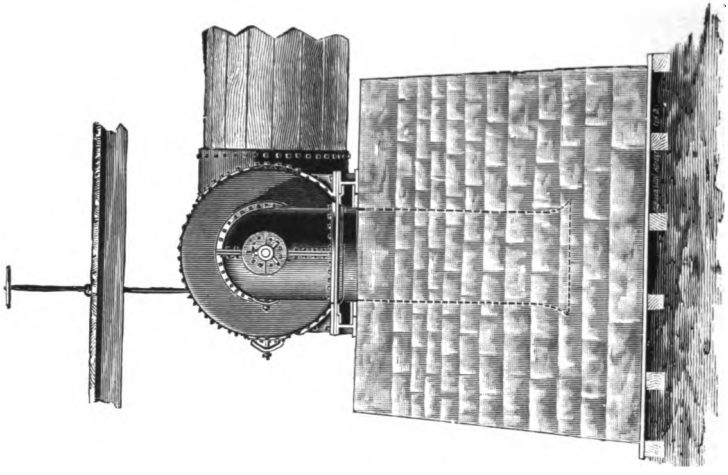

FIG. 32.

FIGS. 32 represent side and end elevations of a single 35-inch Register Gate Victor Turbine on horizontal shaft, put in for the Miami Valley Paper Co., Miamisburg, Ohio. It is operating under 10 feet head and developing about 150 horse-power.

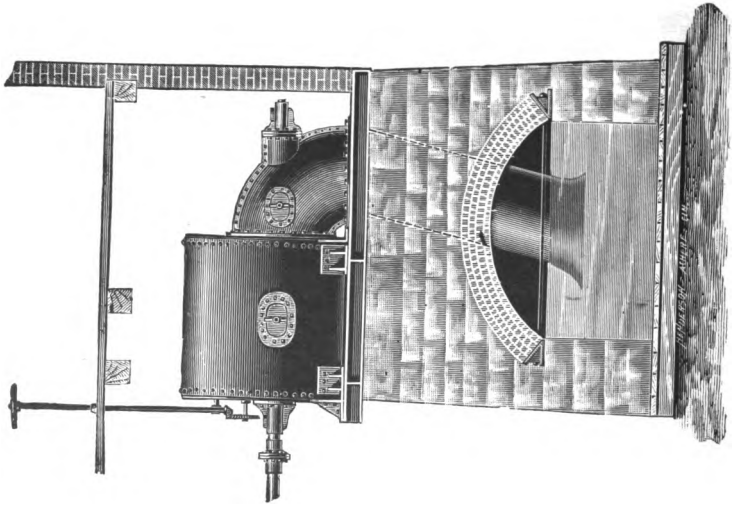

FIG. 32.

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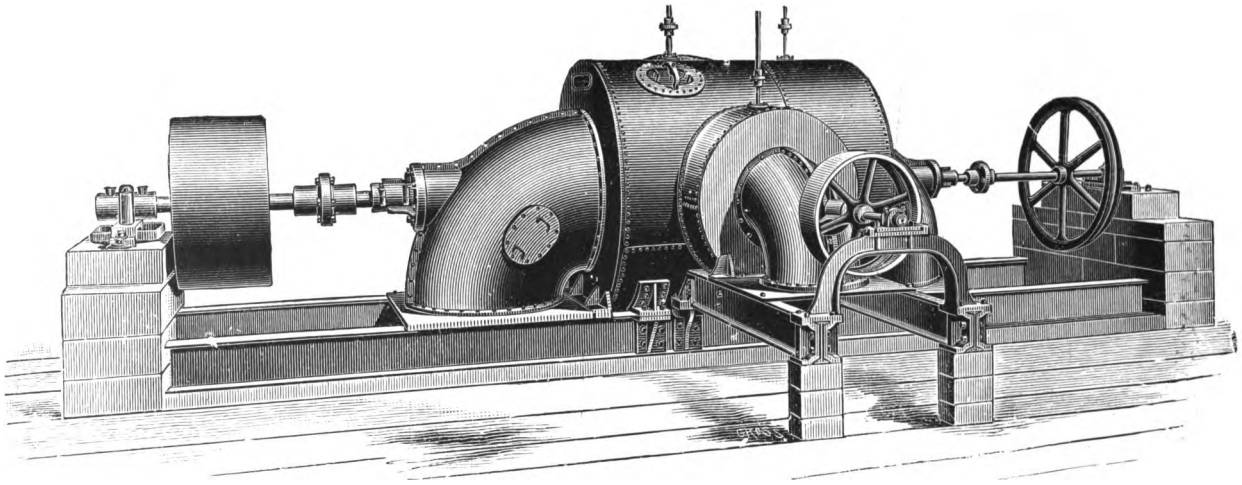

FIG. 33.

REPRESENTS a plant consisting of three single Horizontal Victor Turbines—32½, 20, and 17½ inches diameter—all placed in one flume and supplied by one feeder. Designed to meet the requirements of the situation, and furnished to The Glenside Woolen Mills, Skaneateles Falls, N. Y. Operating under 24 feet head. The 32½-inch Turbine drives the manufacturing department, the 20-inch drives the weaving department, and the 17½-inch drives the picker room.

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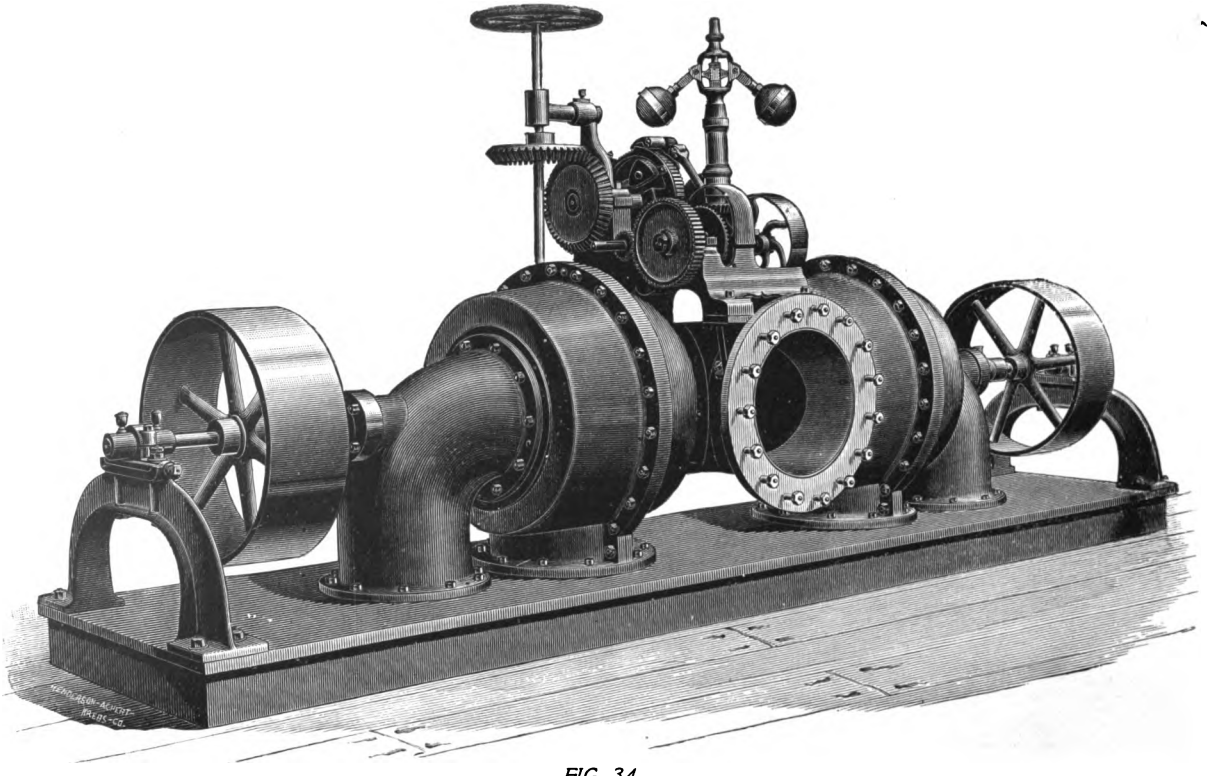

FIG. 34.

Pair of 6-inch Horizontal Victor Turbines, in cast-iron flumes, with Snow Governor. Used for driving an electric-light plant, developing 44 horse-power under 50 feet head. Same design may be used for Turbines up to 12 inches diameter.

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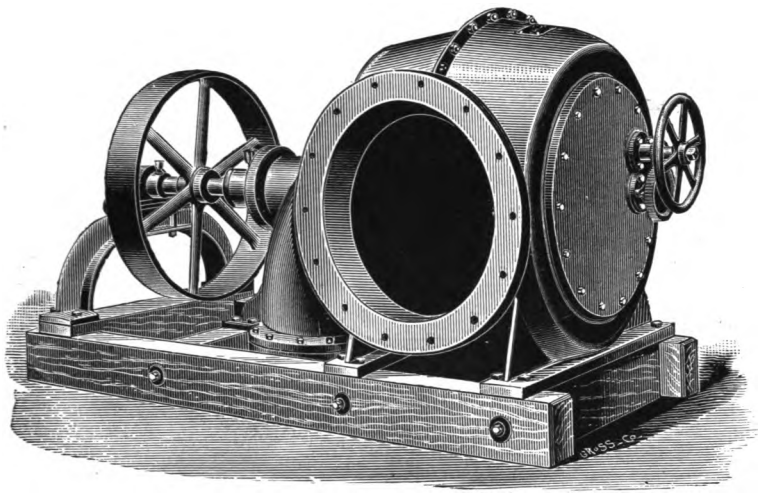

FIG. 35.

Single 12-inch Horizontal Victor Turbine in cast-iron flume, placed on wood foundation.

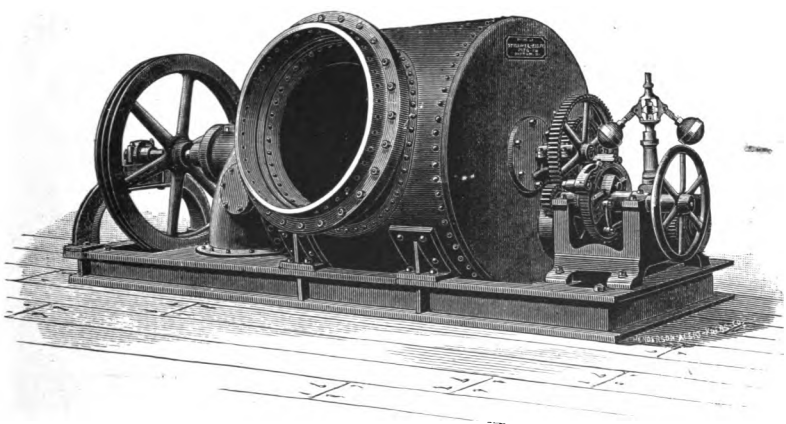

FIG. 36.

Single 15-inch Horizontal Victor Turbine, with Snow Governor and rope drive, furnished H. F. Carpenter Sons & Co., Maiden, N. C., for their cotton mill. Develops 77 horse-power under 35 feet head.

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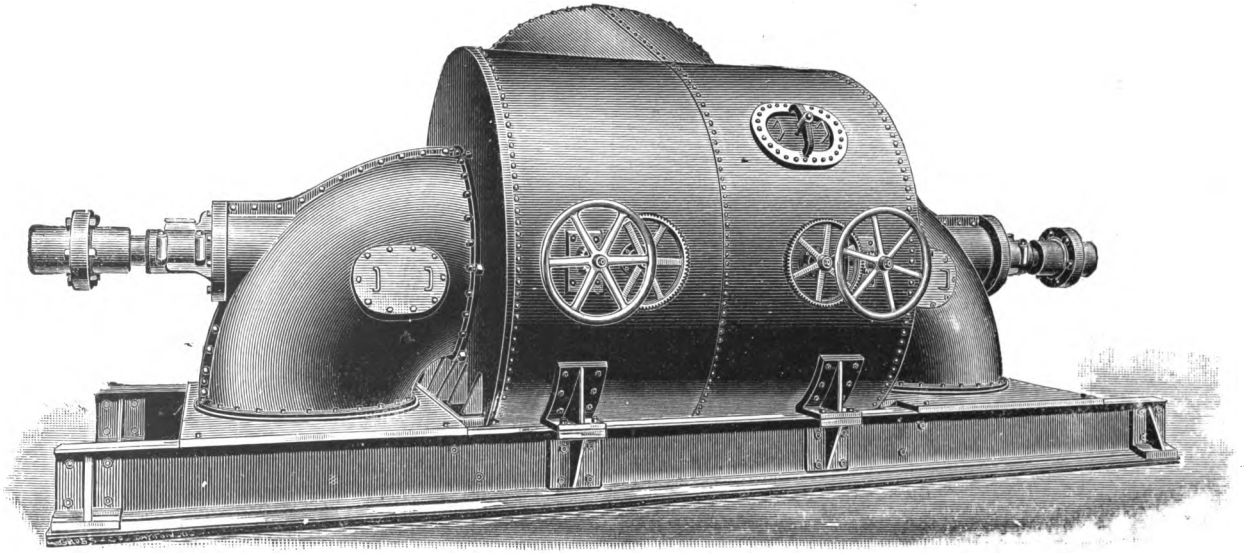

FIG. 37.

This engraving was made from a pair of 30-inch Horizontal Victor Turbines, placed in one flume, but operating independently. They are placed under 60 feet head, develop 1,180 horse-power, and drive two lines of wood-pulp grinders.

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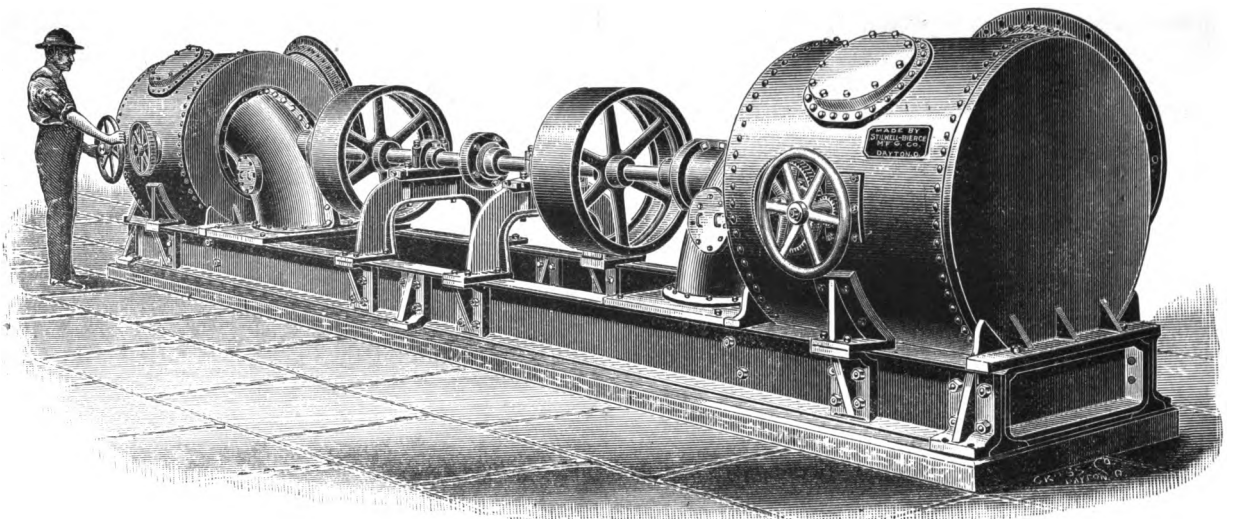

FIG. 38.

Two single 15-inch Horizontal Victor Turbines for North Yakima Water Works, North Yakima, Wash., develop 160 horse-power under 36 feet head. We are large manufacturers of Steam and Power Pumps for all purposes, and our facilities for furnishing complete water power plants for city water-works or for irrigating purposes are unsurpassed, and designs, with estimates, will be submitted on application.

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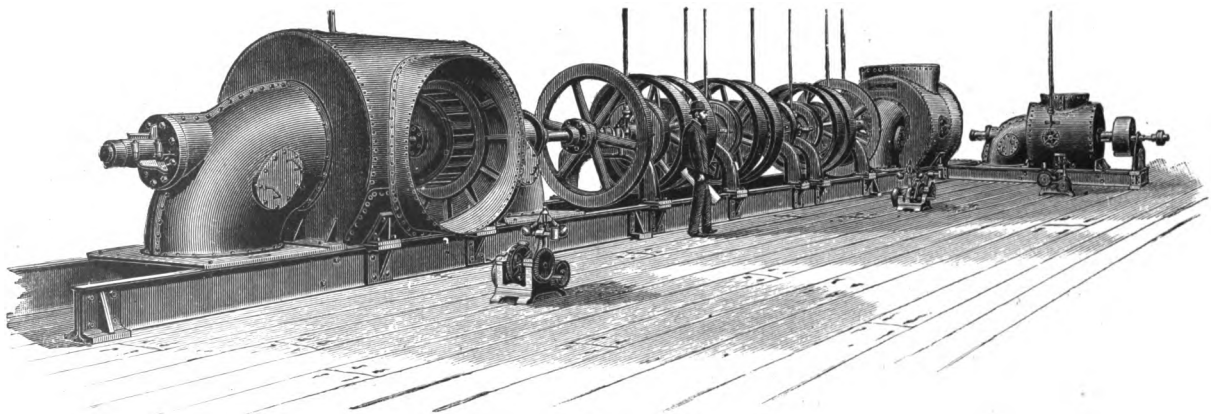

FIG. 39.

Two pairs of 25-inch and one single 17½-inch Victor Turbines on horizontal shafts, with Rice's patent friction pulleys, used under 24 feet head, by the Olympia Electric Light and Power Co., Olympia, Wash. We are making a specialty of complete water-power plants for electric lighting, electric railways, etc., and our work in that line is unequaled.

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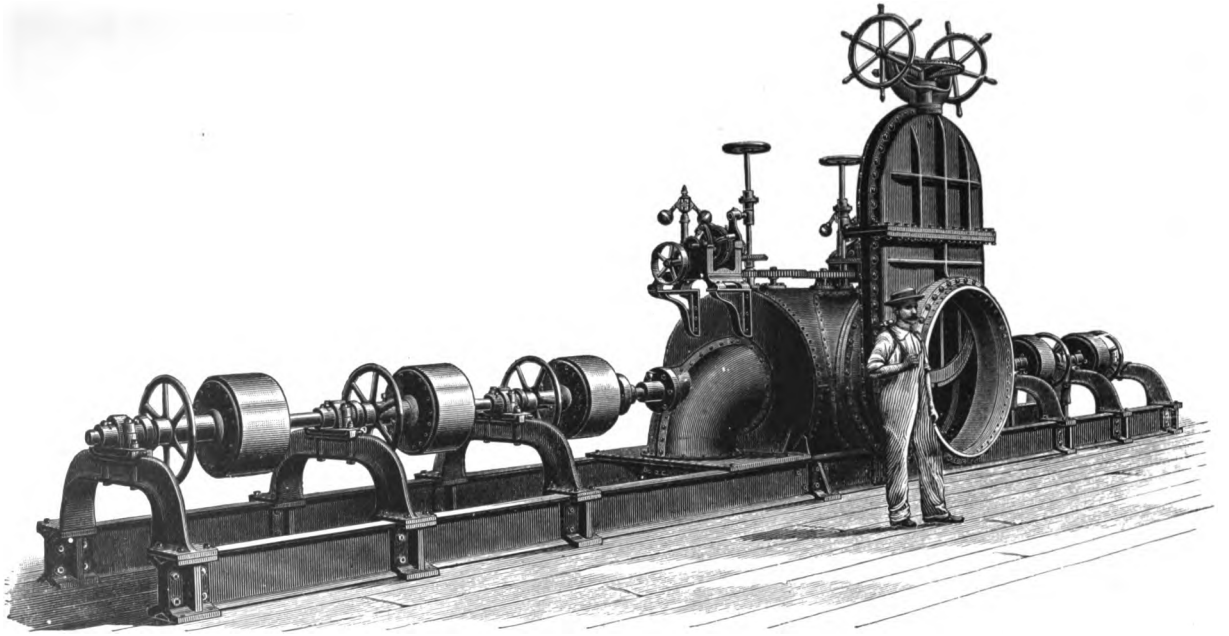

FIG. 40.

THIS engraving was made from a pair of Victor Turbines on horizontal shafts, equipped with friction pulleys, for driving six dynamos direct from Water Wheel Shafts. The feeder is provided with a valve gate for shutting out the water in case of necessity. Each Turbine is independent, having its own gate rig and governor, and drives three dynamos, either one of which can be cut out at will by means of the friction pulleys without interfering with the others. Designs and estimates for this kind of work will be furnished on application.

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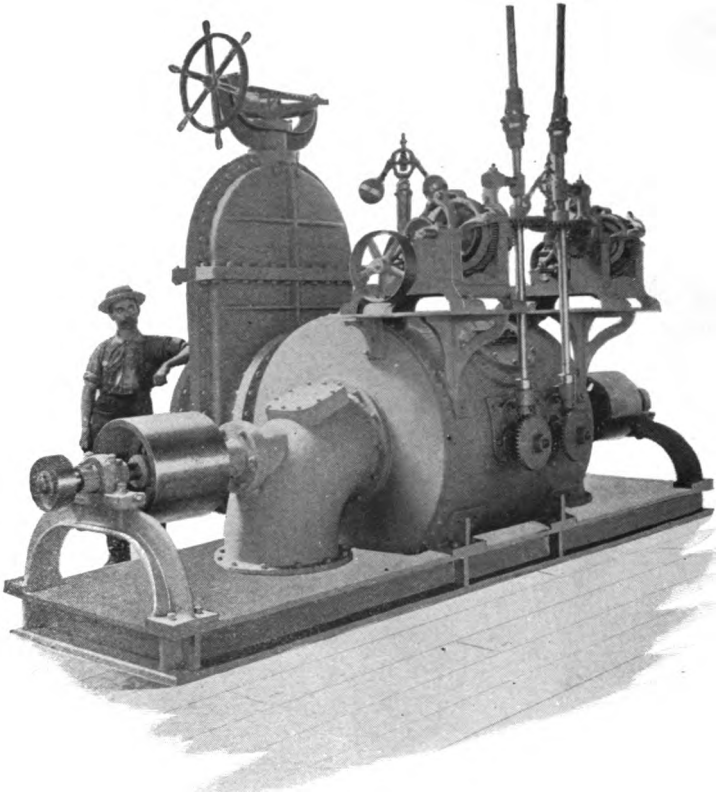

FIG. 41.

THIS engraving represents a pair of 10-inch Horizontal Victor Turbines made for The Edison Electric Illuminating Co., Spokane Falls, Wash., to operate under 70 feet head, developing 186 horse-power, and arranged to drive two dynamos direct from Water Wheel Shafts. The feeder is furnished with a valve gate for shutting out the water in case of necessity. Each Turbine is entirely independent, being provided with a separate gate and governor, so that either one or both can be operated at will.

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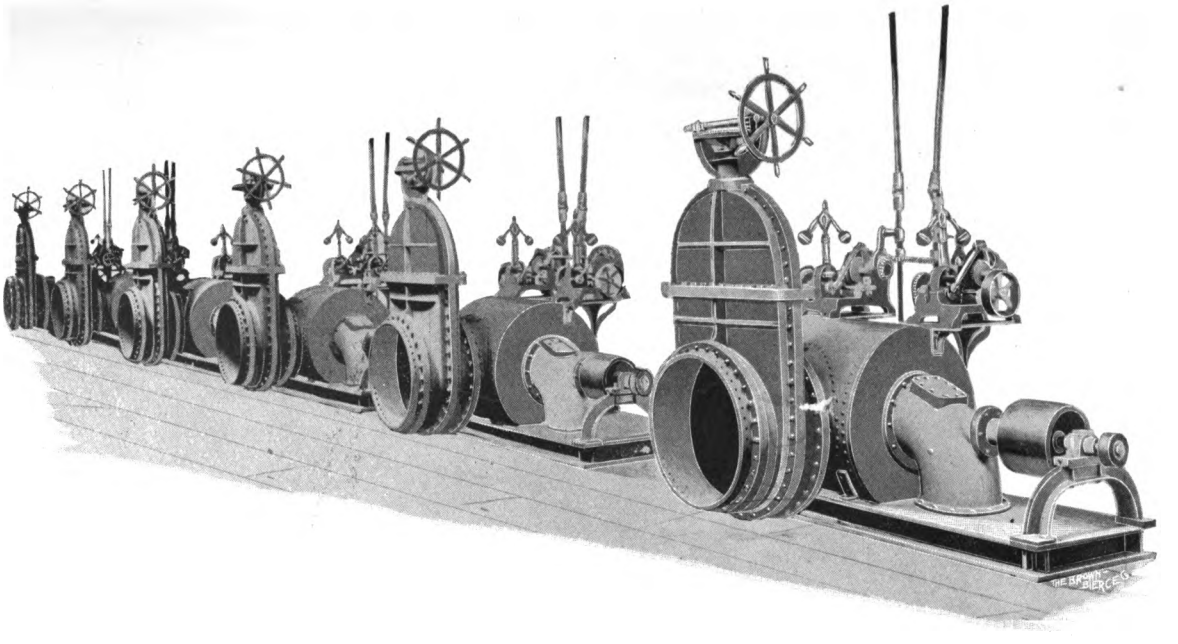

FIG. 42.

THIS engraving represents six pairs of Horizontal Victor Turbines furnished The Washington Water Power Co., Spokane Falls, Wash., to operate under 70 feet head. These Wheels are all placed in one line and supplied with water from one large iron penstock, not shown; the branch feeder to each pair is provided with a valve gate for shutting out the water, and each Turbine of each pair is entirely independent, being provided with its own gate and governor, so that either one or all of the twelve Turbines can be operated at will.

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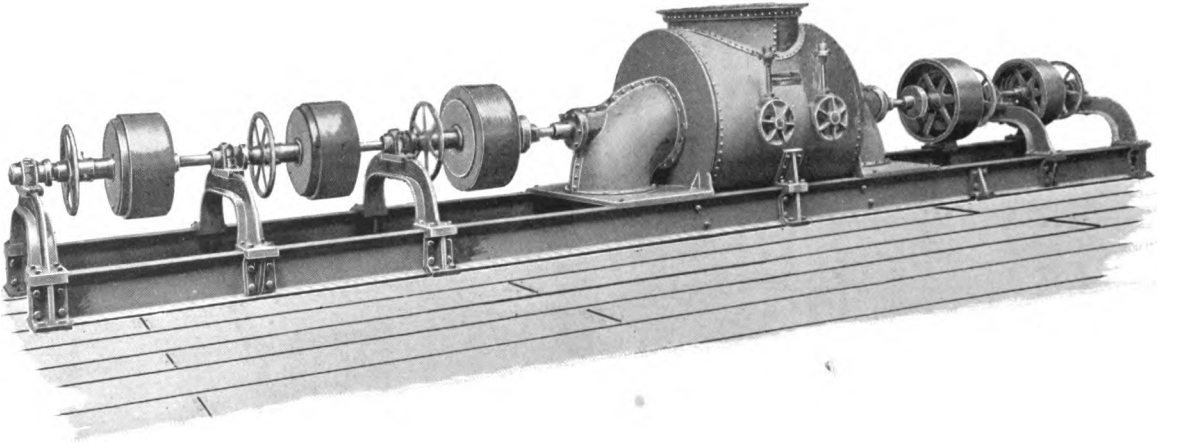

FIG. 43.

THIS engraving accurately illustrates a pair of 15-inch Victor Turbines on horizontal shaft, equipped with friction pulleys for driving dynamos direct from Water Wheel shaft, in use by The Edison Electric Illuminating Co., Spokane Falls, Wash. The results obtained during several months' use were so highly satisfactory as to secure us the entire contract for Water Wheels and power connections for the large plant erected by them. Designs and estimates for this line of work will be cheerfully submitted on application.

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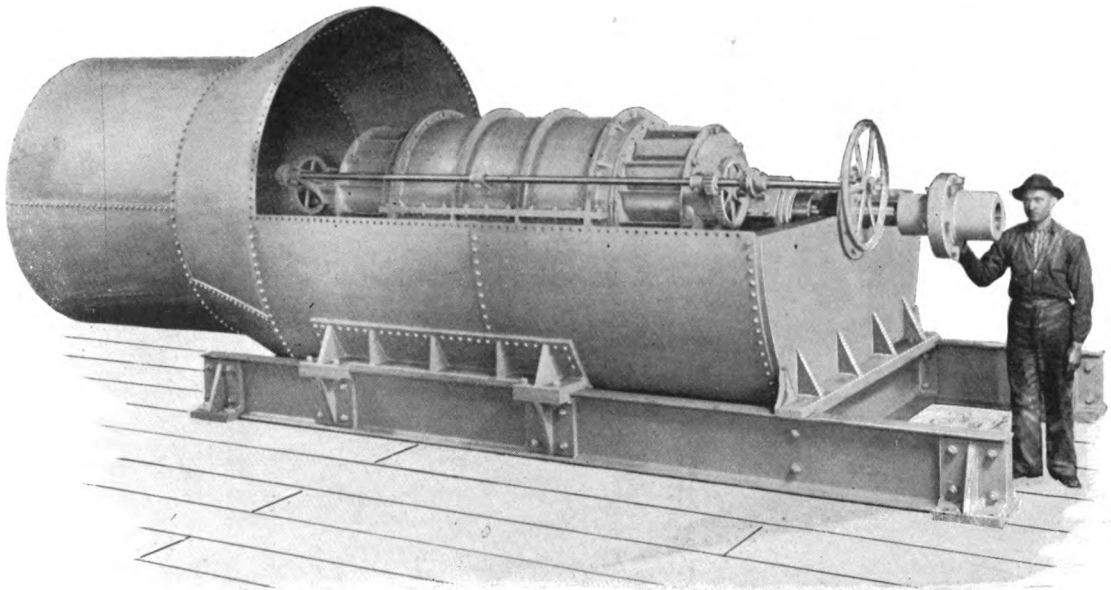

FIG. 44.

THIS engraving was made from the photograph of a pair of Horizontal Victor Turbines, seated upon and discharging into a cast-iron draft box, the whole placed within a wrought-iron flume (the upper half of which is removed to show the Turbines), having its feeder connection at the end. Seven pairs of 27½-inch Turbines of this design were furnished The Sebago Wood Board Co., South Windham, Maine. They operate under 17 feet head, and develop 1,078 horse-power. The design is of special interest as an indication of our ability to meet the requirements of peculiar and difficult locations.

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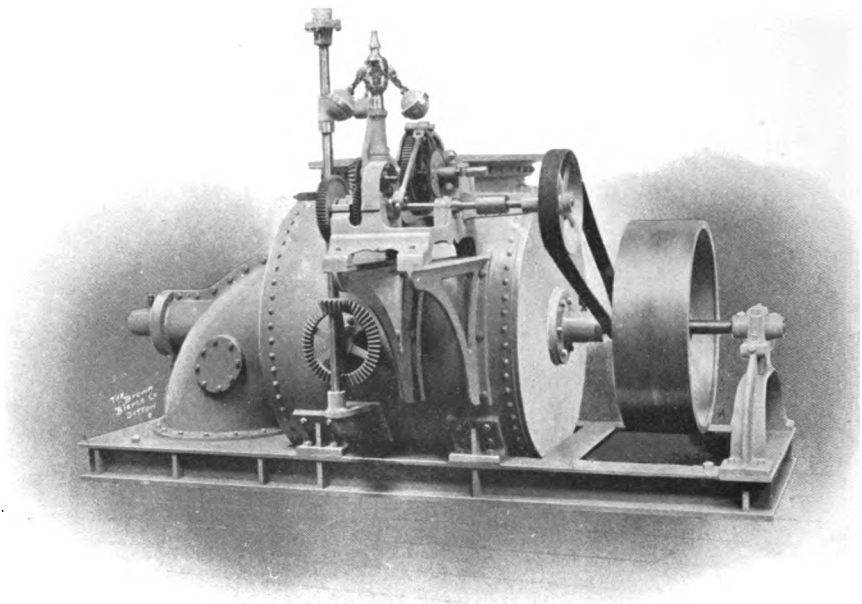

FIG. 45.

SINGLE 15-inch Horizontal Victor Turbine, with flume and governor complete, all mounted upon an iron bed plate, furnished through our London agent to parties in South Africa for driving a plant of mining machinery. The Wheel operates under 80 feet head, and develops 266 horse-power. The arrangement is very simple, compact and substantial.

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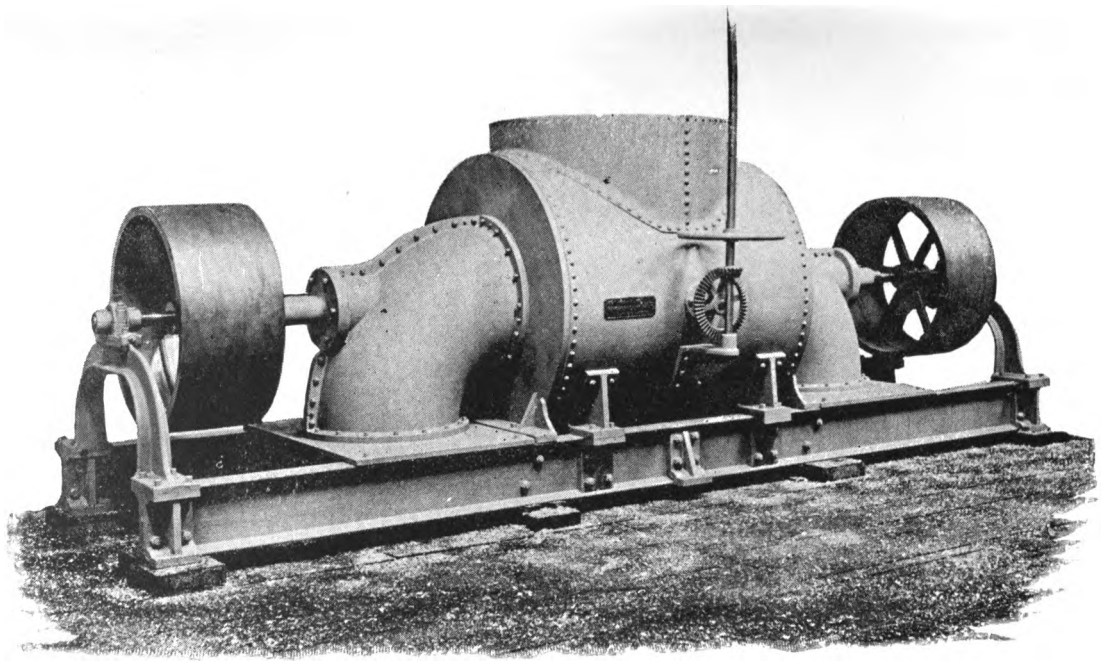

FIG. 46.

Pair of 17½-inch Horizontal Victor Turbines used for driving the cable street railway at Spokane Falls, Wash., operating under 36 feet head and developing 196 horse-power. A very neat and substantial job.

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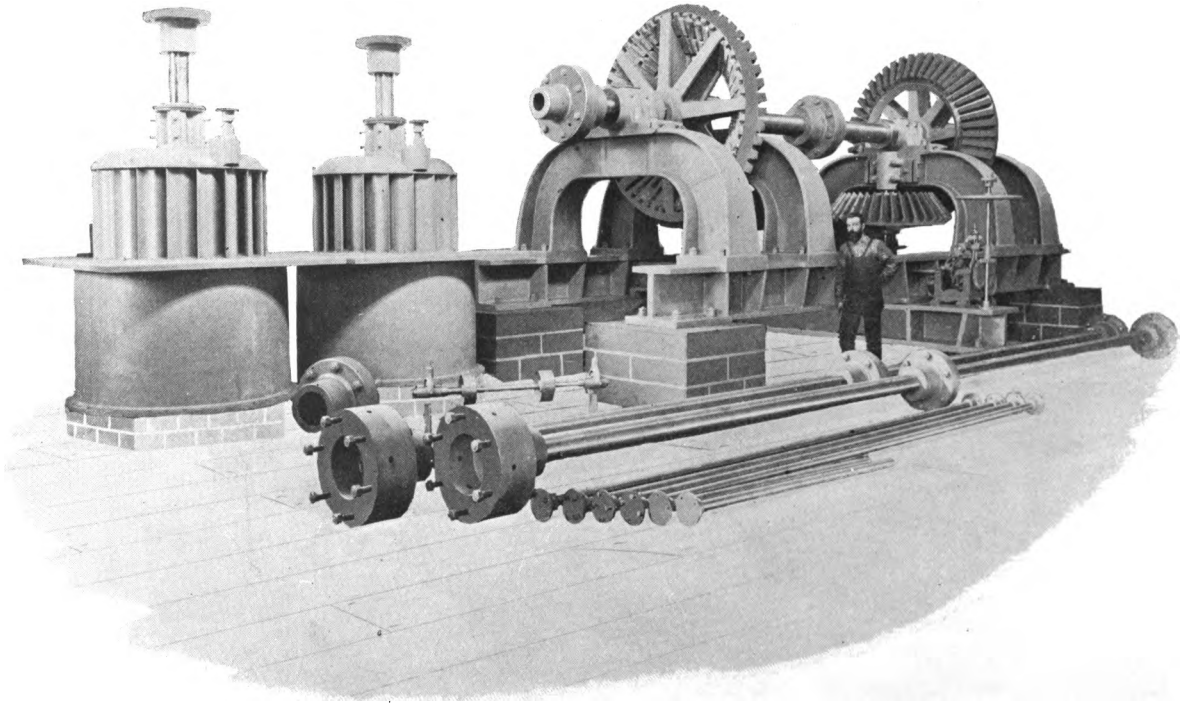

FIG. 47.

Two 40-inch Upright Victor Turbines, with governor and power connections, furnished C. C. Washburn Mills Co., Minneapolis, Minn., for their "A" mill. Operating under 45 feet head, and developing about 1,400 horse-power.

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FIG. 48.

Jack shaft and driving pulleys, bevel mortise gears with iron harness, and fire pump, driven by friction gears direct from jack shaft, furnished with three 55-inch Upright Victor Turbines, furnished the Piedmont Manufacturing Co. (cotton mill), Piedmont, S. C. Develop 857 horse-power under 19 feet head.

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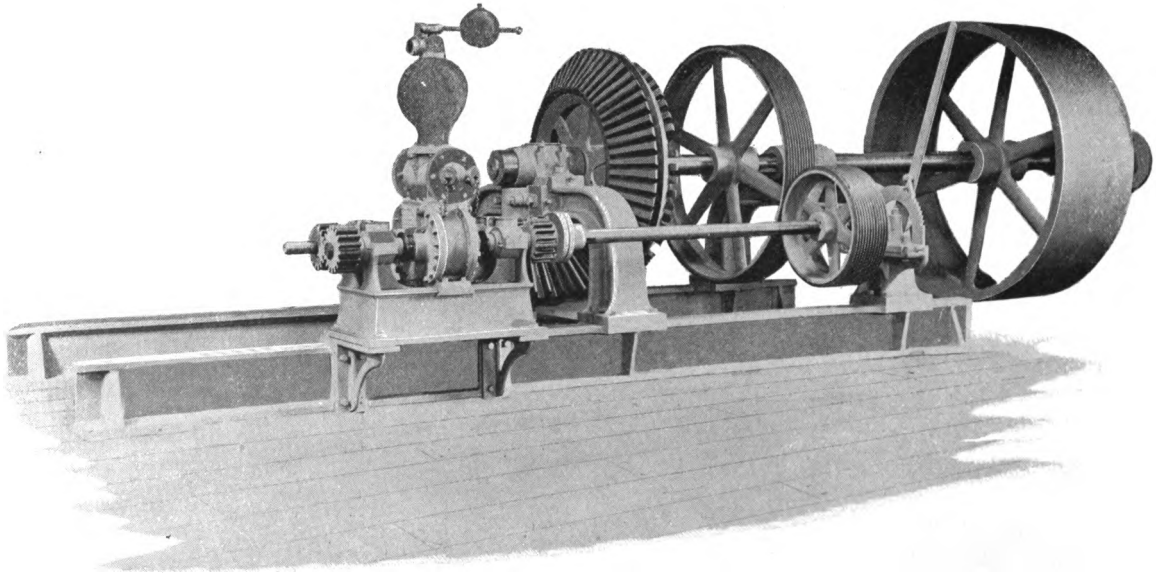

FIG. 49.

Power connections and fire pump furnished with 35-inch Upright Victor Turbine to The Pelham Mfg. Co., Pelham, S. C. (cotton mill). Develops 215 horse-power under 24 feet head.

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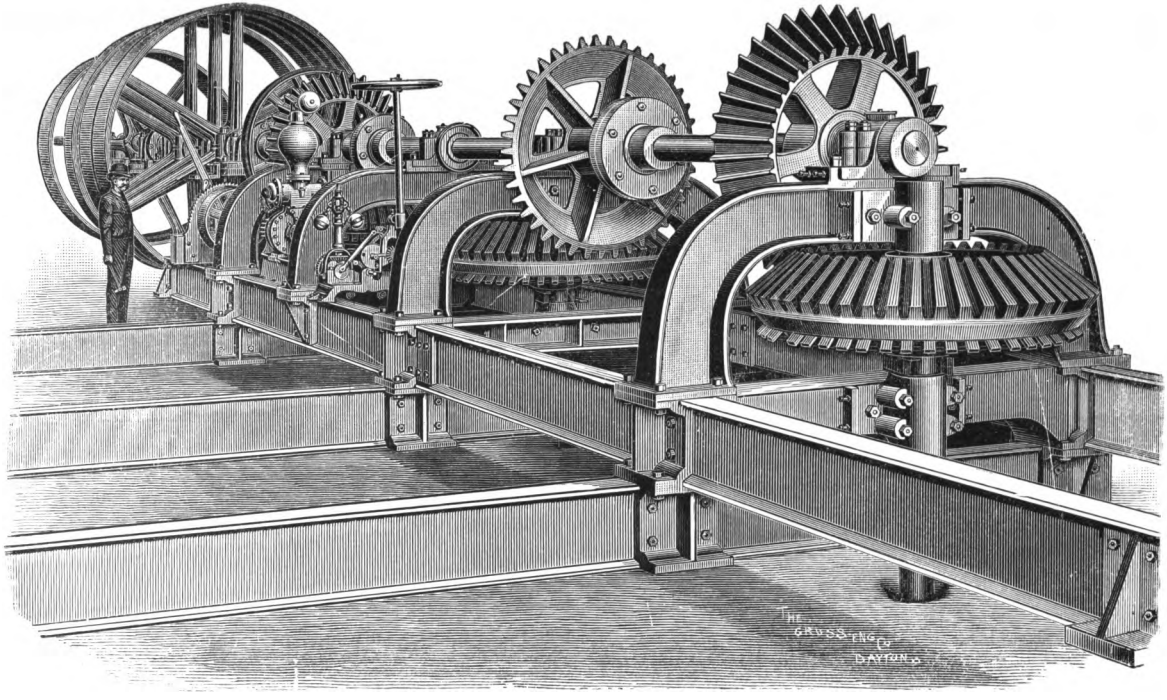

FIG. 50.

Fig. 50 fairly illustrates the superior character of our work in the line of Heavy Gears, Pulleys, etc., for transmitting power. The engraving was made from a job furnished The Piedmont Mfg. Co. for their large cotton mill at Piedmont, S. C. The power plant consists of three 48-inch Victor Turbines, in iron flumes, with iron feeders and draft tubes, the whole surmounted by the heavy iron girders, beams, yokes, gears, pulleys, etc., as shown. Our facilities for such work, and also the quality of our work, both in design and workmanship, are unsurpassed.

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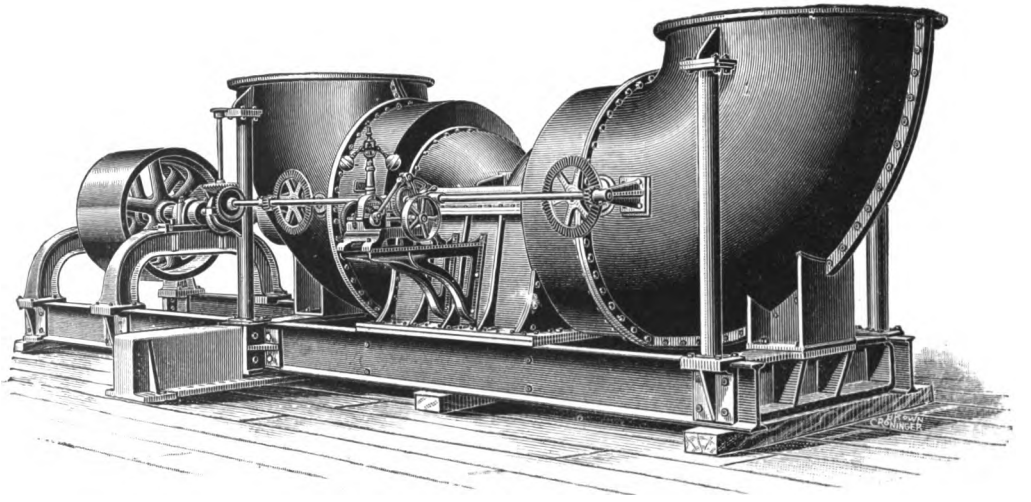

FIG. 51.

THE above engraving represents one pair of 21-inch "Cylinder Gate" Victor Turbines on horizontal shaft, designed especially for the city electric light and power plant belonging to the city of Austin, Texas. We also furnished the Turbines and Pumps for the City Water Works, located on the same power. These Wheels operate under about sixty feet head.

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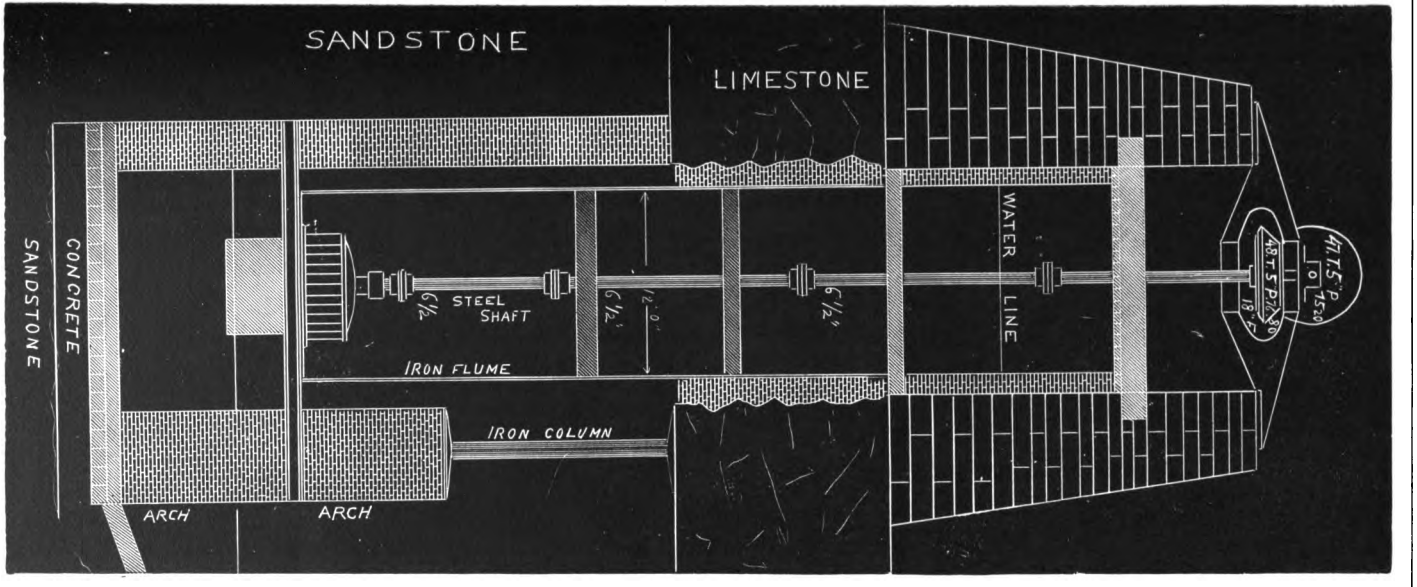

Sectional elevation of Flume and Wheel Pit in Pillsbury "A" Mill, Minneapolis, Minn, showing manner of setting their two 55-inch Victor Turbines, under 50-feet head. These wheels have been displaced by two Improved 48-inch "Cylinder Gate" Victor Turbines, which afford a large increase in power. This is the largest flour mill in the world.

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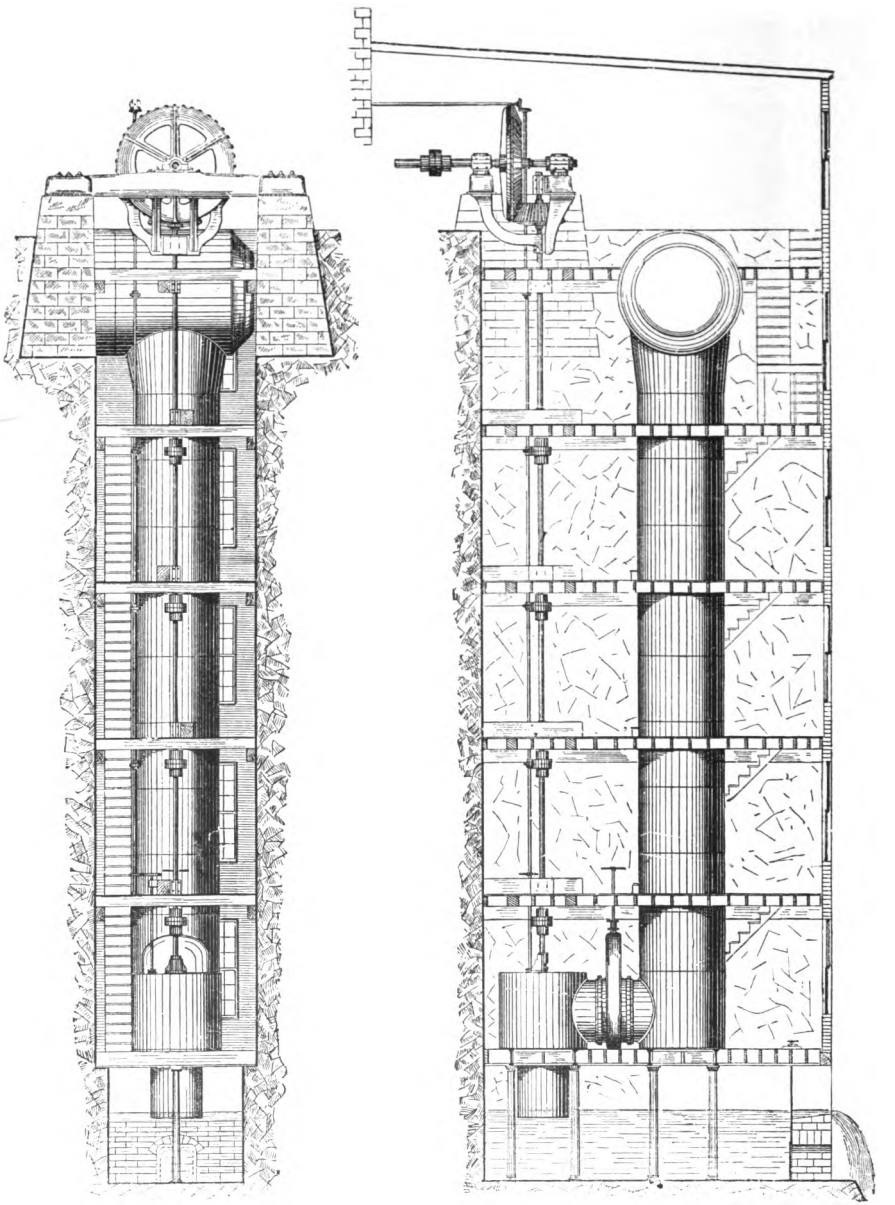

Setting of 35-inch Victor Turbine under 68 feet head, in Flour Mill of Central Milling Co., Niagara Falls, N. Y.

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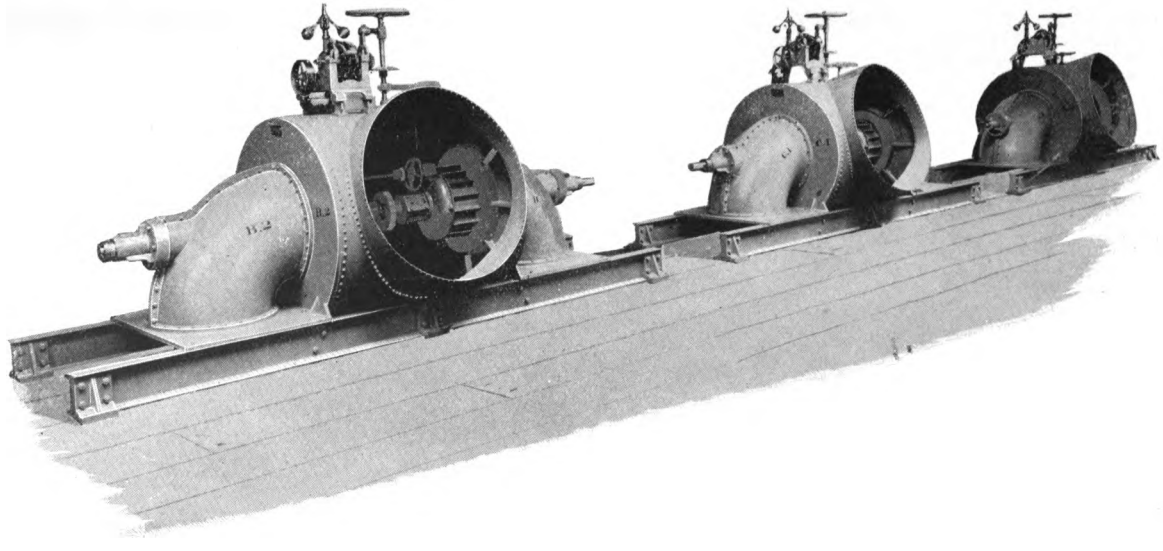

FIG. 52.

Three pairs of 20-inch Horizontal Victor Turbines to furnish power for an electric plant in Brazil. Built for the Thompson-Houston International Electric Co., Boston, Mass.

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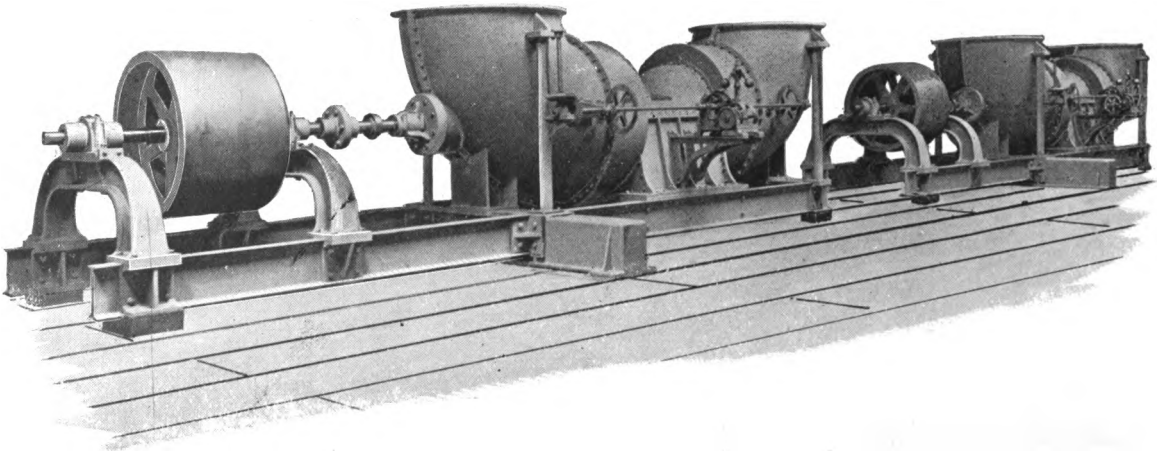

FIG. 53.

Pair 21-inch "Cylinder Gate" Victor Turbines on horizontal shaft, with two feeders and center discharge. Four pairs furnished the city of Austin, Texas, for its electric light station. Developing 2,584 horse-power under 56 feet head.

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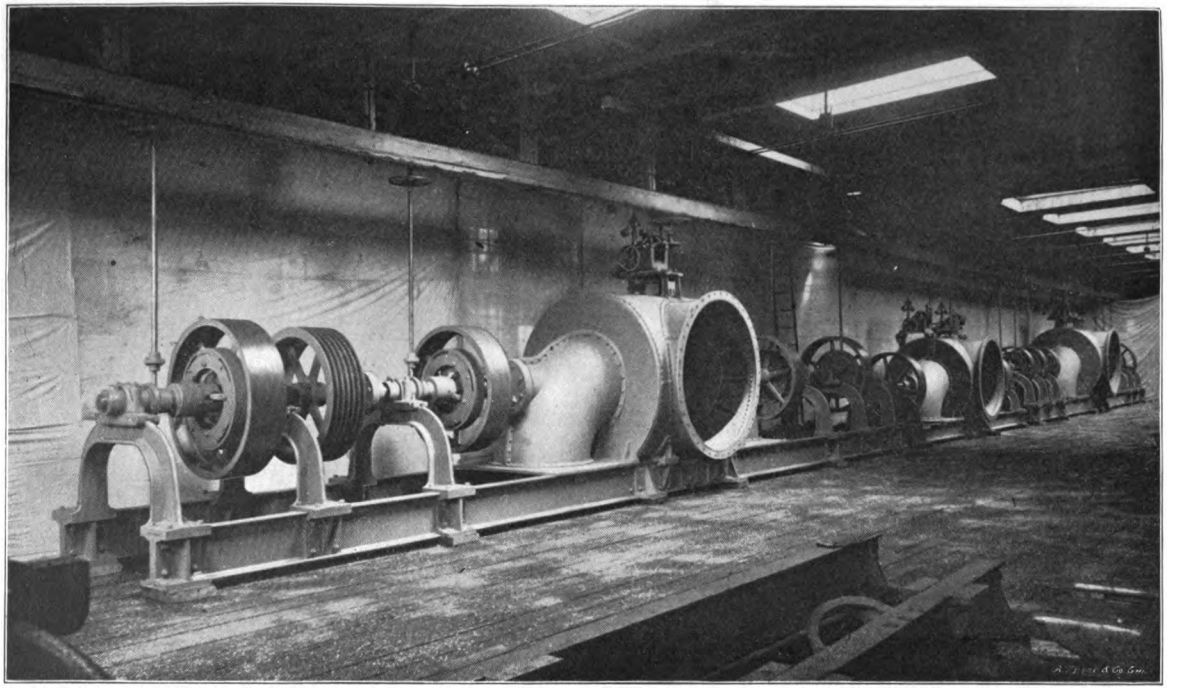

FIG. 54.

Two pair 22½-inch and one pair 20-inch Horizontal Victor Turbines, developing 1,102 horse-power under 40 feet head. Entire power plant for the Boston and Great Falls Electric Light & Power Co., Great Falls, Mont.

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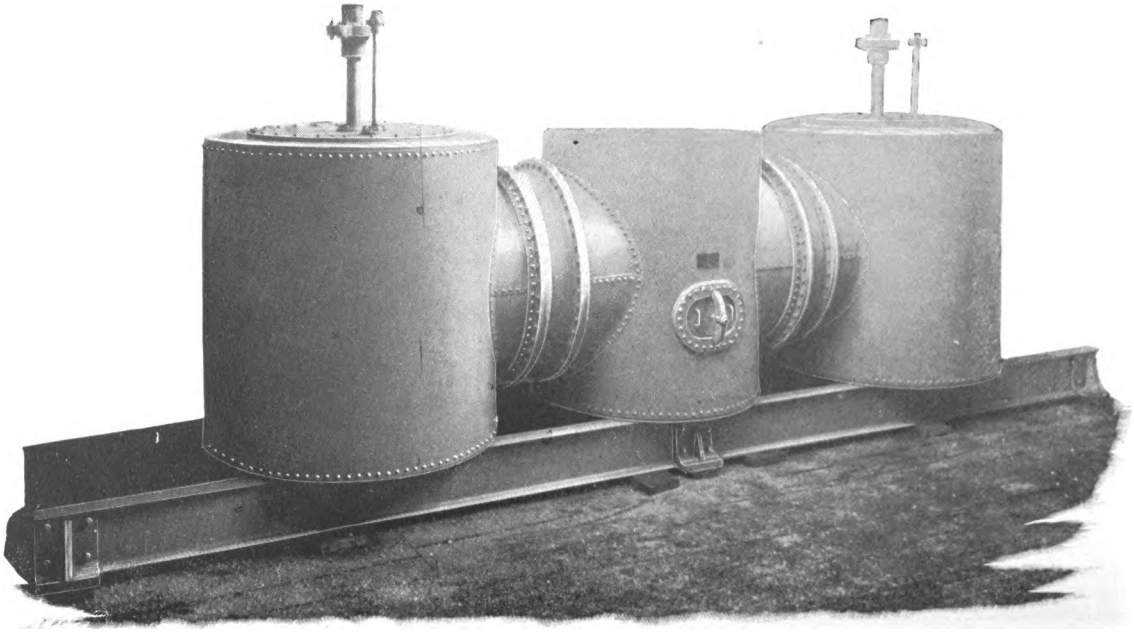

FIG. 55.

Two special 30-inch Upright "Cylinder Gate" Victor Turbines in wrought-iron flumes, with center feeder. Furnished to the city of Austin, Texas, for its water works pumping station. Developing 550 horse-power under 56 feet head.

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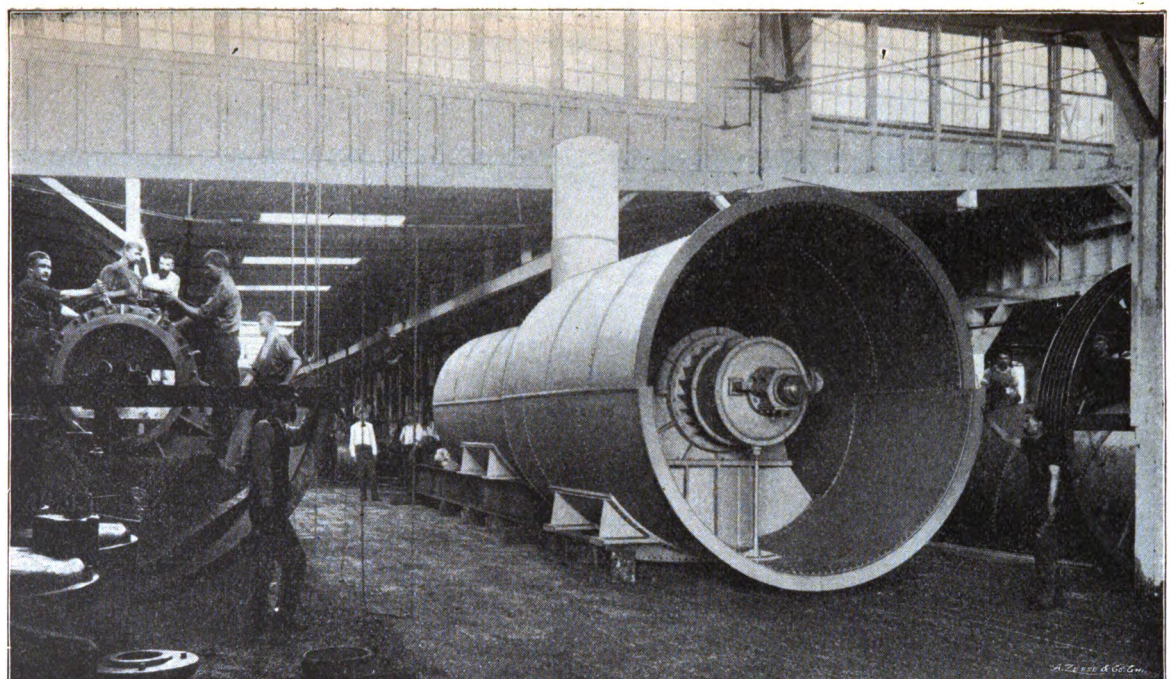

FIG. 56.

Two pairs 27-inch Horizontal Cylinder Gate Victor Turbines, with center discharge, in one flume. Developing 455 horse-power under 20 feet head. Seven sets like this furnished the Hollingsworth & Whitney Co., Winslow, Me.

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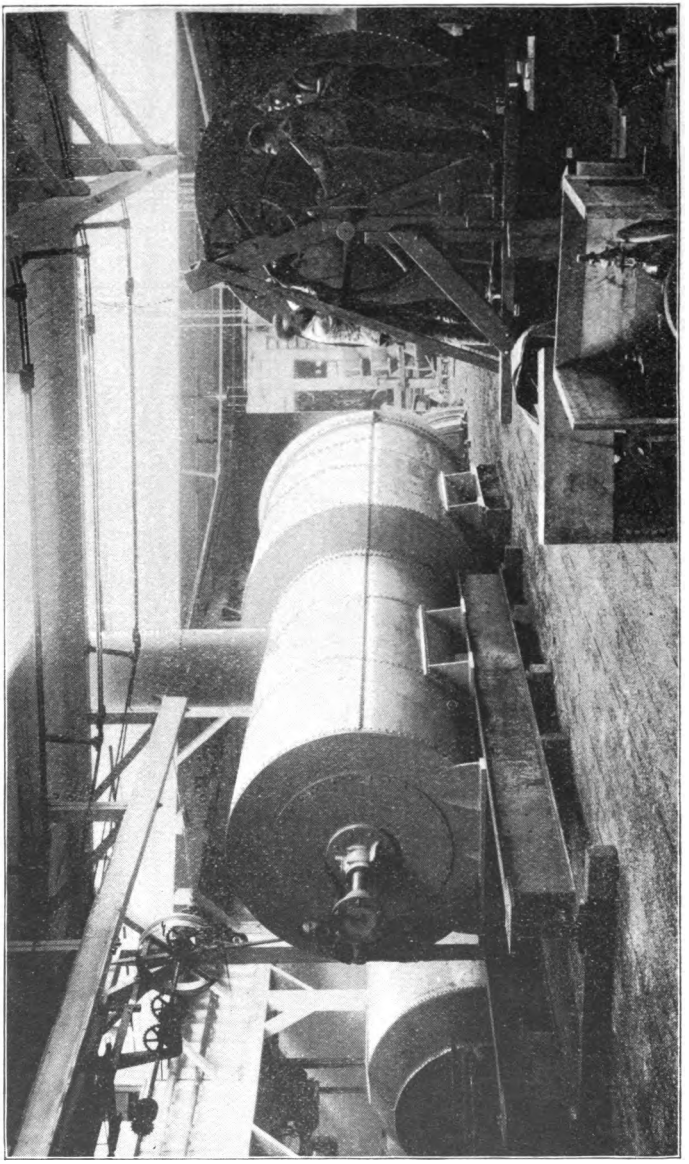

FIG. 57.

Same as Fig. 56. Rear view.

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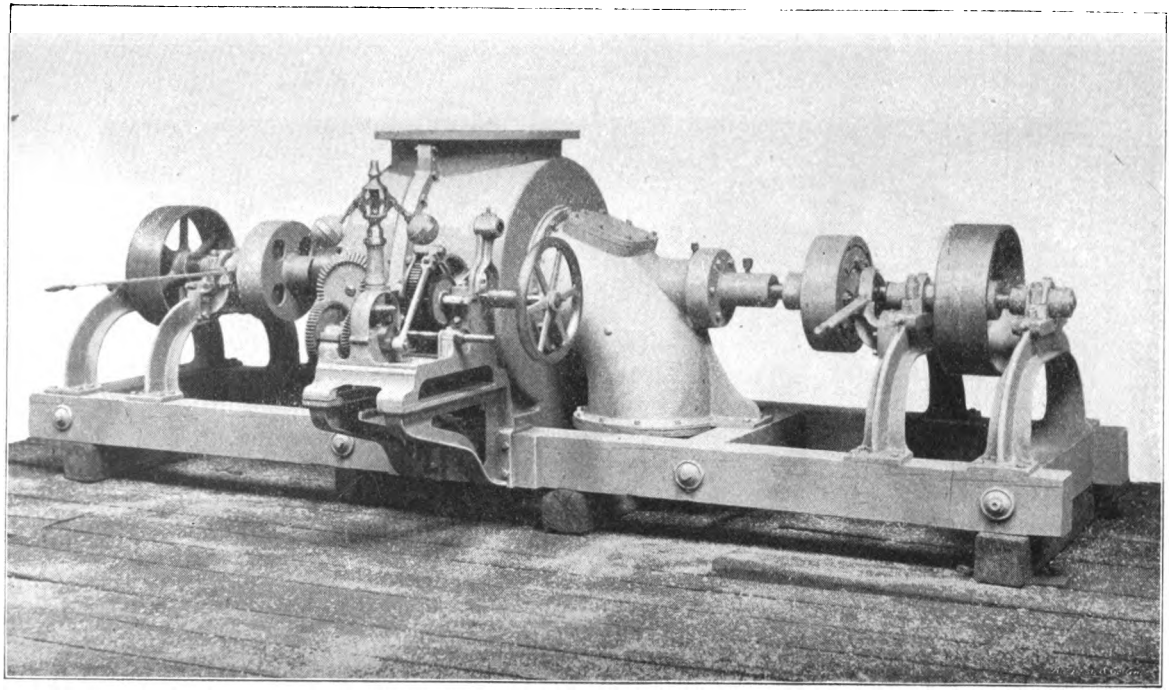

FIG. 58.

Single 12-inch Horizontal Victor Turbine, in cast-iron flume, fitted with Rice's Patent Friction Clutches. Made for Fred. Nell, London, England.

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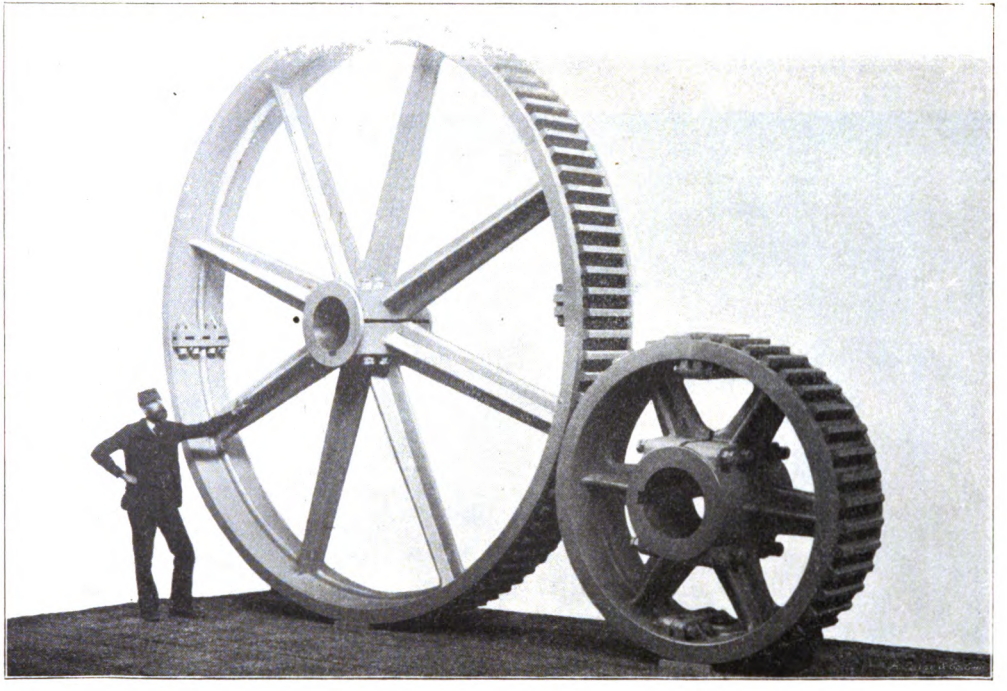

FIG. 59.

Large Spur Gear. 71.68 and 165.54 inches diameter, 45 and 104 teeth, 16-inch face, 5-inch pitch; wheel bored for 15-inch shaft, and pinion for 16-inch shaft.

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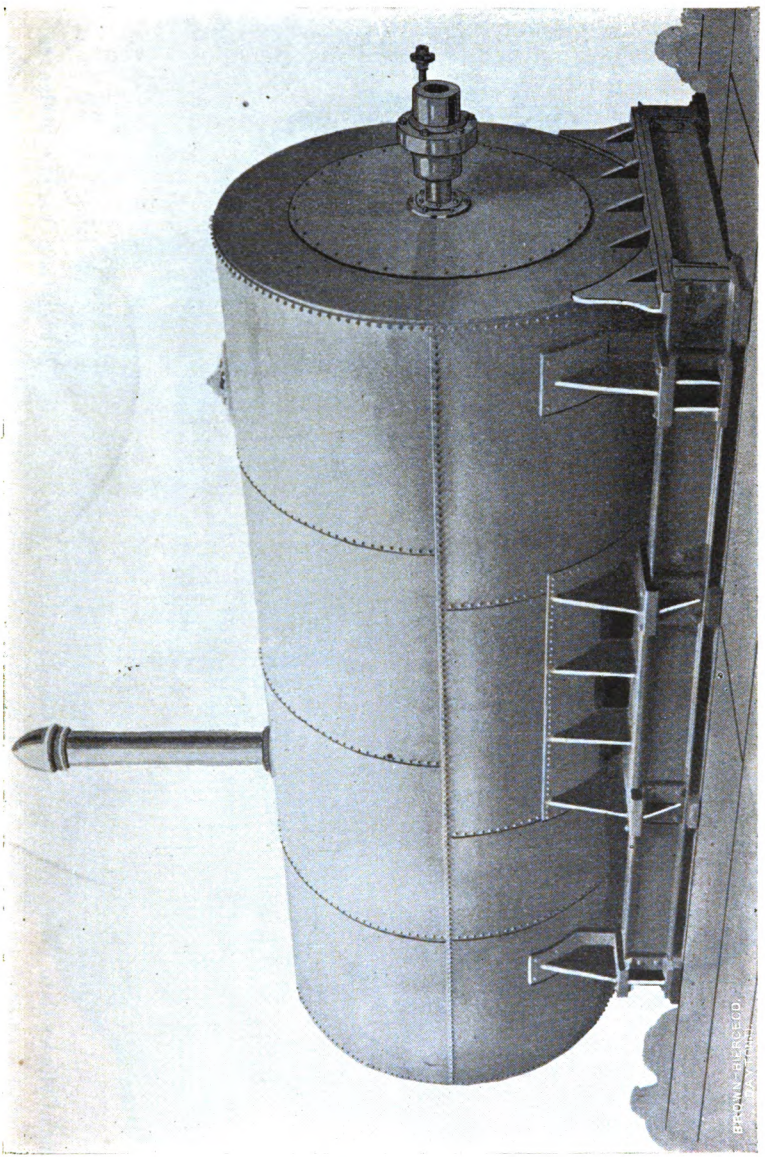

FIG. 60.

Pair 36-inch Cylinder Gate Victor Turbines on horizontal shaft, in wrought-iron flume, with center discharge. Furnished The Nekoosa Paper Co., Nekoosa, Wis. Developing 328 horse-power under 18 feet head.

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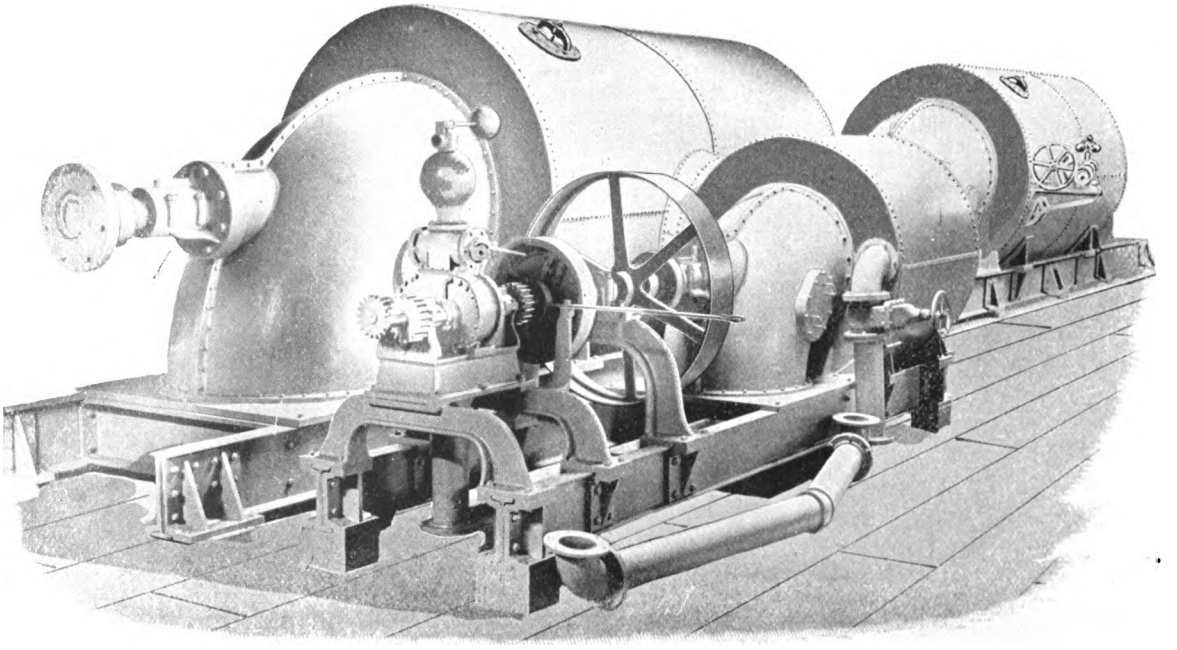

FIG. 61.

Two pairs 48-inch Cylinder Gate Victor Turbines on horizontal shaft, and single 24-inch Cylinder Gate Victor Turbine on horizontal shaft, the latter connected with fire pump by a Mason friction coupling. Furnished the Columbia Cotton Mills Co., Columbia, S. C. Developing 2,190 horse-power under 26 feet head.

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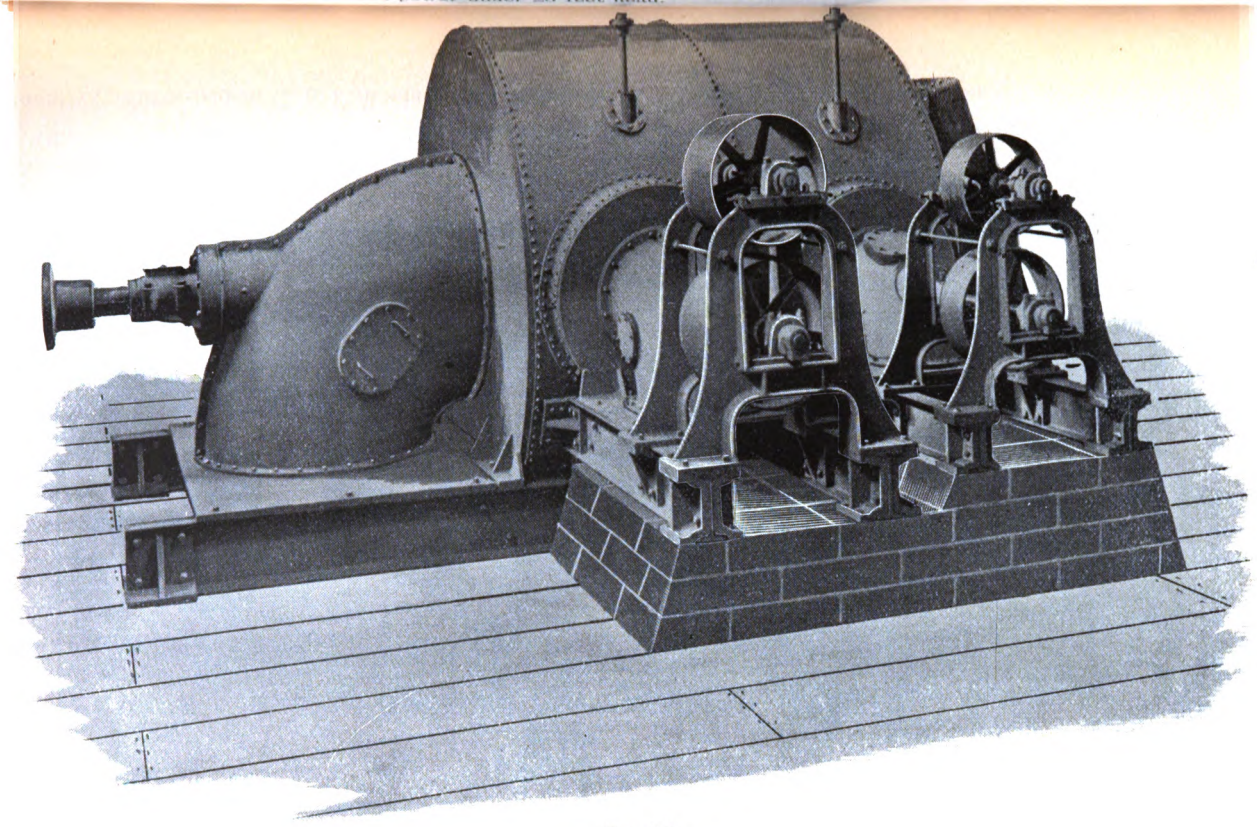

Fig. 62.

One 36-inch $\frac{37}{38}$ Cylinder Gate, one 15-inch and one 12-inch Register Gate Victor Turbines on horizontal shafts, in one flume. Furnished the Chateaugay Pulp Co., Chateaugay, N. Y. Developing 809 horse-power under 45 feet head.

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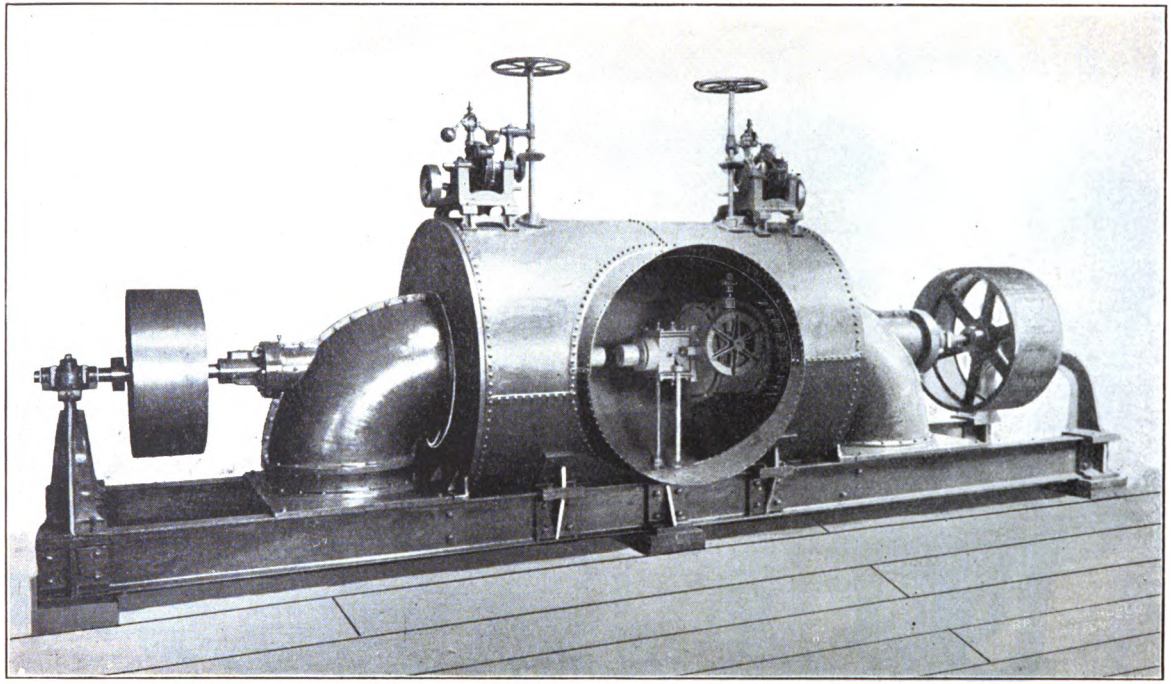

FIG. 63.

One 18-inch and one 21-inch Cylinder Gate Victor Turbine on horizontal shaft, in one flume and operating independently. Furnished E. G. & E. Wallace, Rochester, N. Y. Developing 495 horse-power under 52 feet head.

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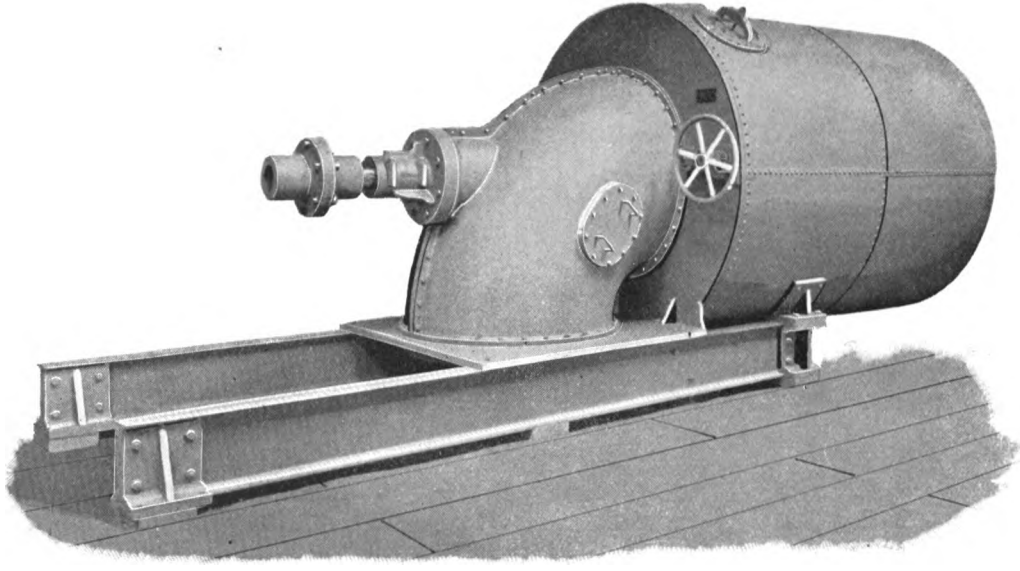

FIG. 64.

Two 30-inch and two 33-inch single Cylinder Gate Victor Turbines on horizontal shaft, like this, furnished The Nekoosa Paper Co., Nekoosa, Wis. Developing 520 horse-power under 18 feet head.

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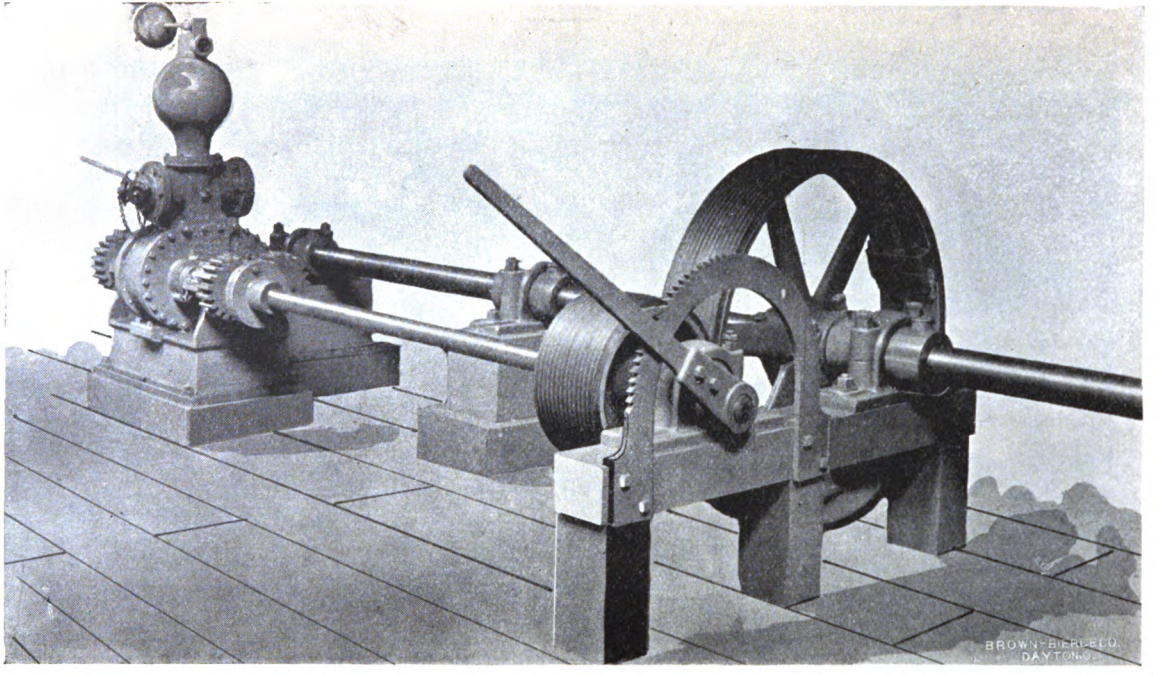

FIG. 65.

Fire Pump, showing our arrangement of eccentric box for starting and stopping Pump when driven with V frictions. Pronounced by engineers and insurance inspectors the best and most reliable arrangement in market.

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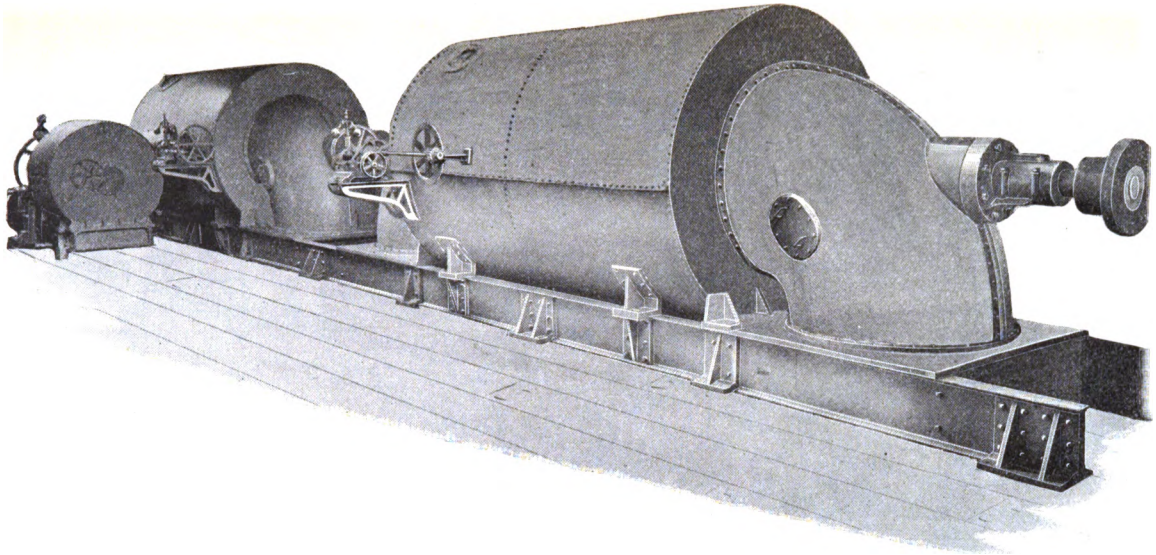

FIG. 66.

Two pairs 48-inch Cylinder Gate Victor Turbines on horizontal shaft, and single 24-inch Cylinder Gate Victor Turbine **on** horizontal shaft, the latter connected with Fire Pump by a Mason Friction Coupling. Furnished the Columbia Cotton Mills **Co.**, Columbia, S. C. Developing 2,190 **horse-power** under 26 feet head.

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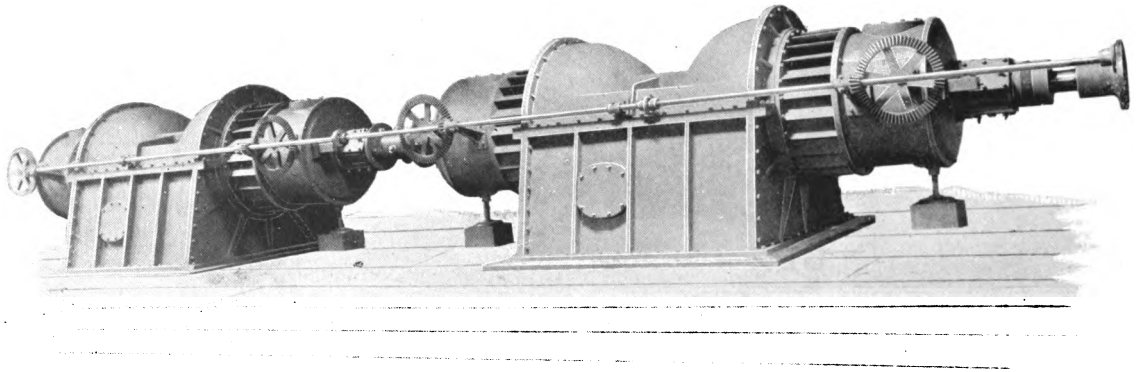

FIG. 67.

Two pair 30-inch Cylinder Gate Victor Turbines on horizontal shaft, with center discharge case, to go in an open flume. Seven sets like this furnished the Nekoosa Paper Co., Nekoosa Wis. Developing 3,217 horse-power under 18 feet head.

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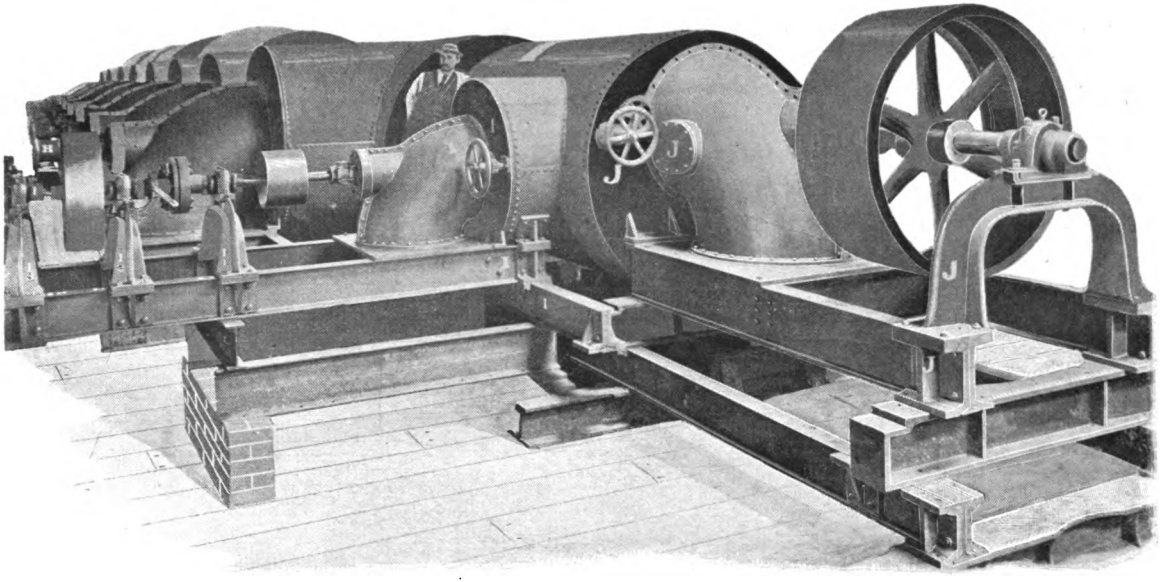

FIG. 68.

Eight 33-inch, one 30-inch and one 15-inch Cylinder Gate Victor Turbines, on horizontal shafts, supplied from one feeder pipe 13 feet diameter at large end, and reducing as wheels are taken off. This outfit was furnished for the power plant of the Freydenburgh Falls Pulp Co., Plattsburgh, N. Y. Developing 4,660 horse-power under 42 feet head.

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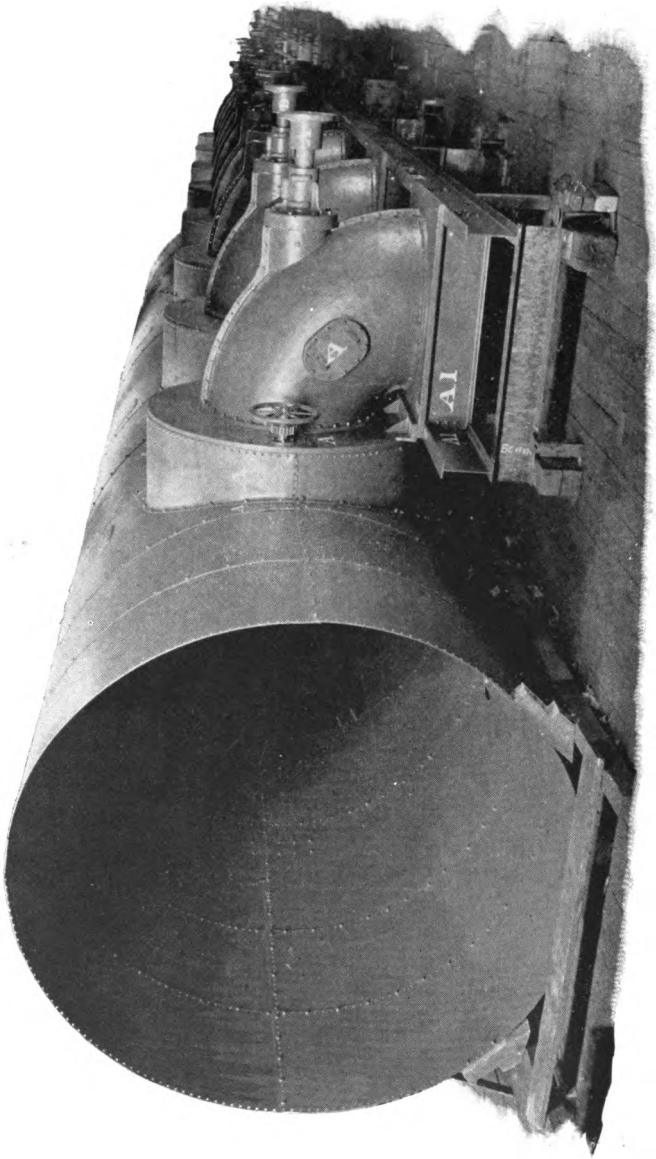

FIG. 69.

Same as Fig. 68, but photographed from the opposite end.

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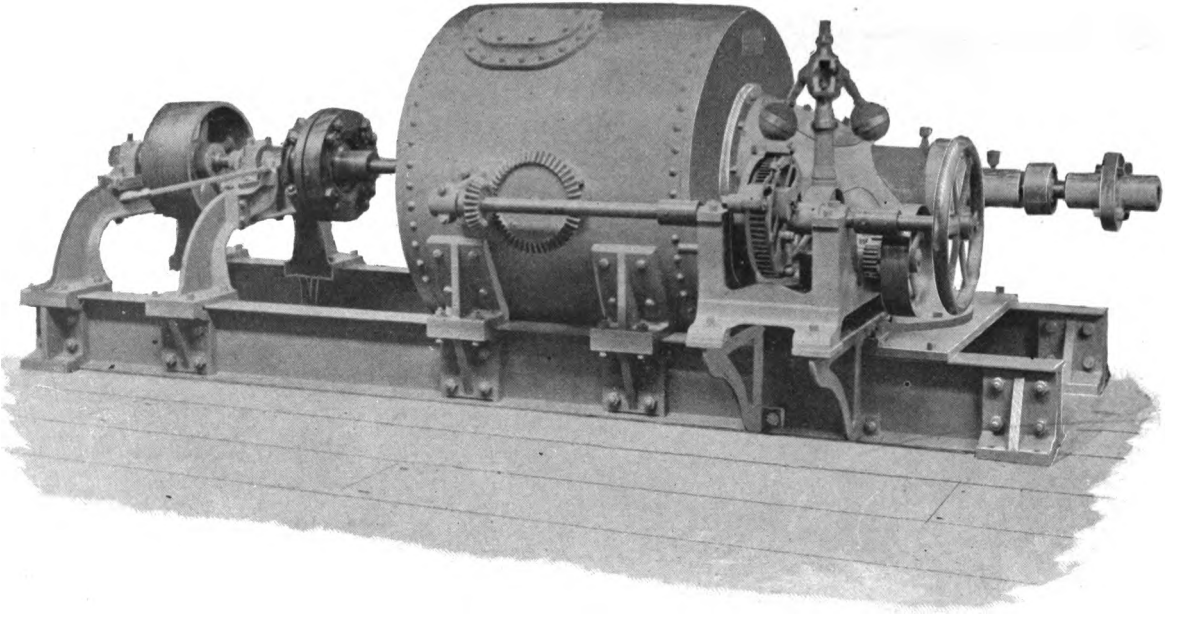

FIG. 70.

Single Victor Turbine on horizontal shaft, equipped with our Snow Governor and arranged with 12-inch Worrall Friction Coupling at one end for disconnecting pulley. Furnished Fred. Nell, London, England.

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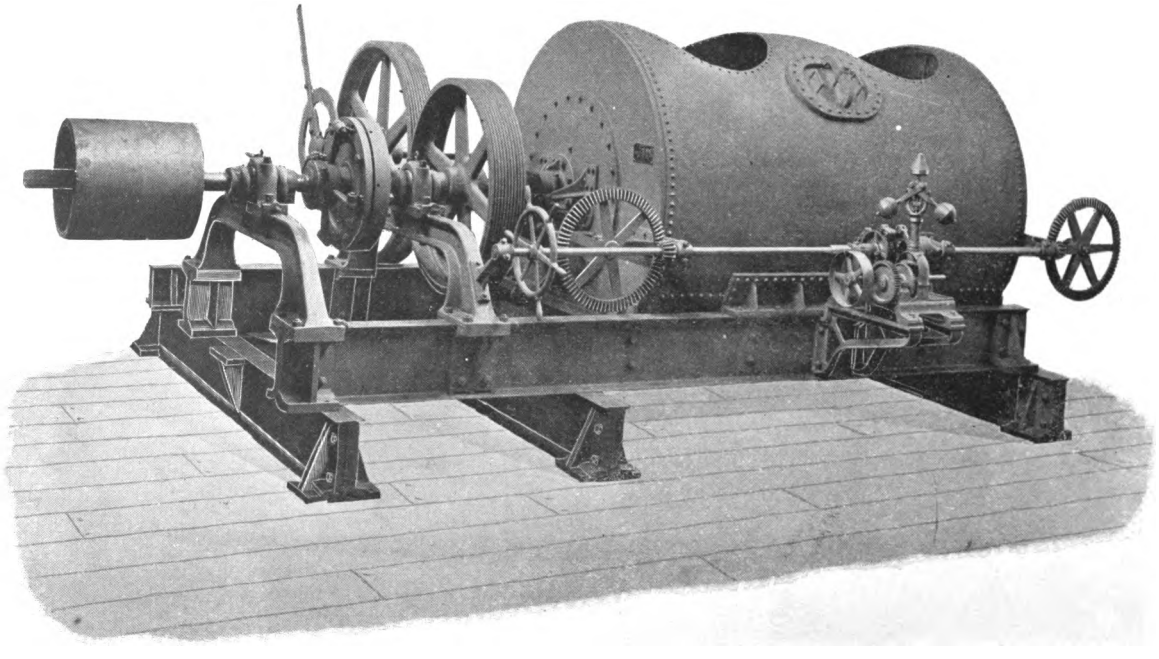

FIG. 71.

Pair 18-inch Cylinder Gate Victor Turbines fitted with governor and fire pump drive. Wheels mounted on center discharge case inside of steel flume. Furnished the Norwalk Mills Co., Norwalk, Conn.

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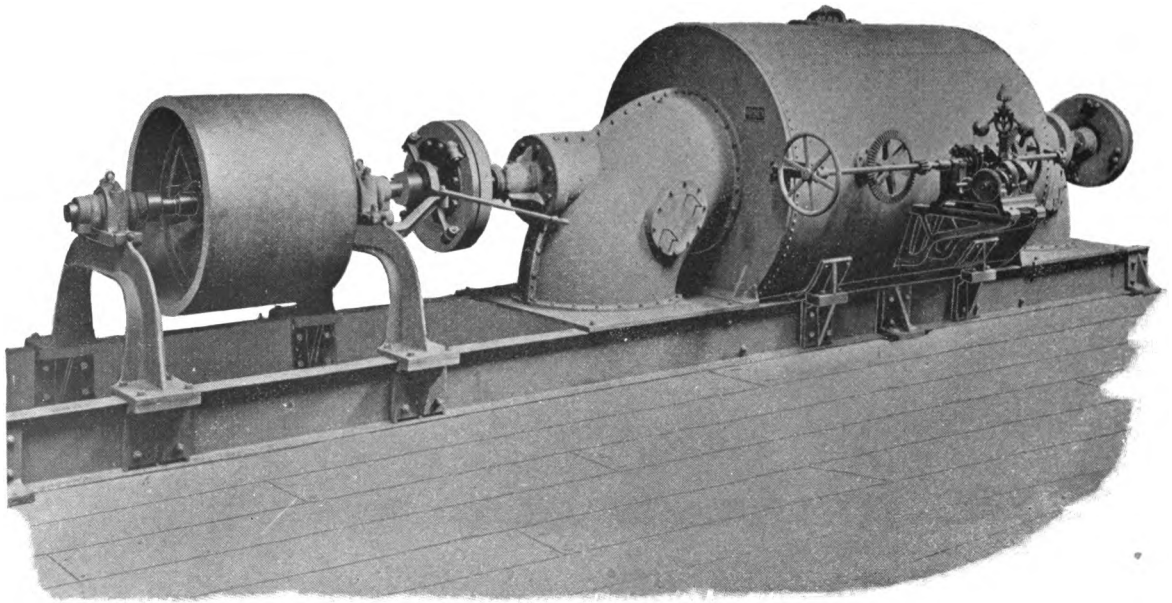

FIG. 72.

Pair 21-inch Cylinder Gate Victor Turbines, with one end direct connected to an electric generator and the opposite end furnished with pulley for driving pumps. Fitted with Worrall friction couplings, so that generator or pumps can be cut off.

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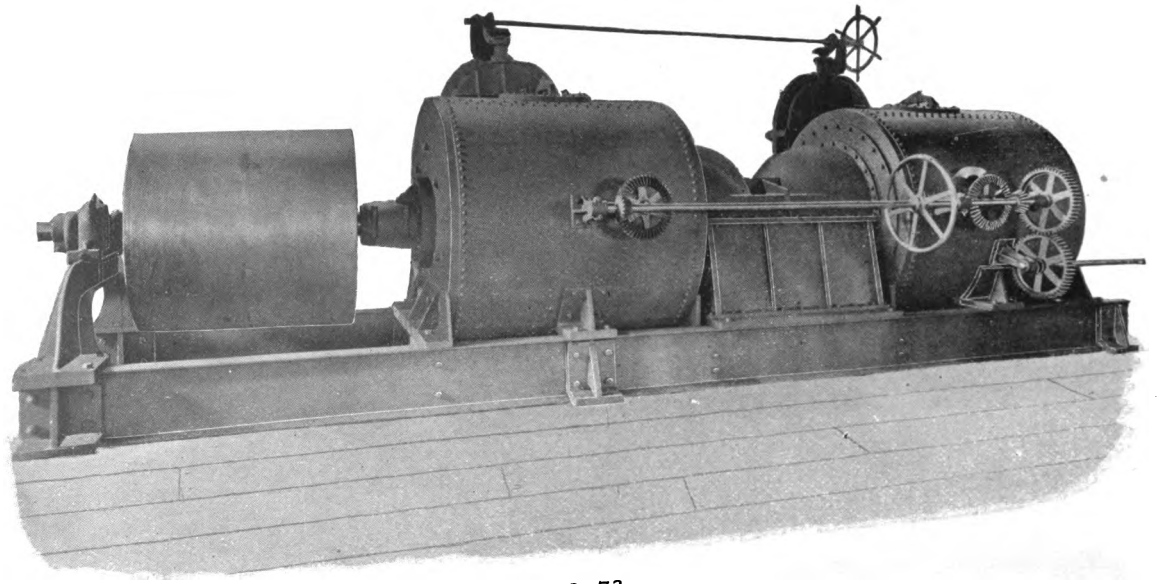

FIG. 73.

PAIR special 36-inch Cylinder Gate Victor Turbines. Each Wheel in separate flume, but discharging into one draft tube. Feeder-pipe into each flume fitted with a valve for shutting out the water. Three pairs furnished The Parrot Silver & Copper Co., Butte, Mont. Each pair develops 500 horse-power under 90 feet head. The three pairs fitted with two Giesler electro-mechanical governors.

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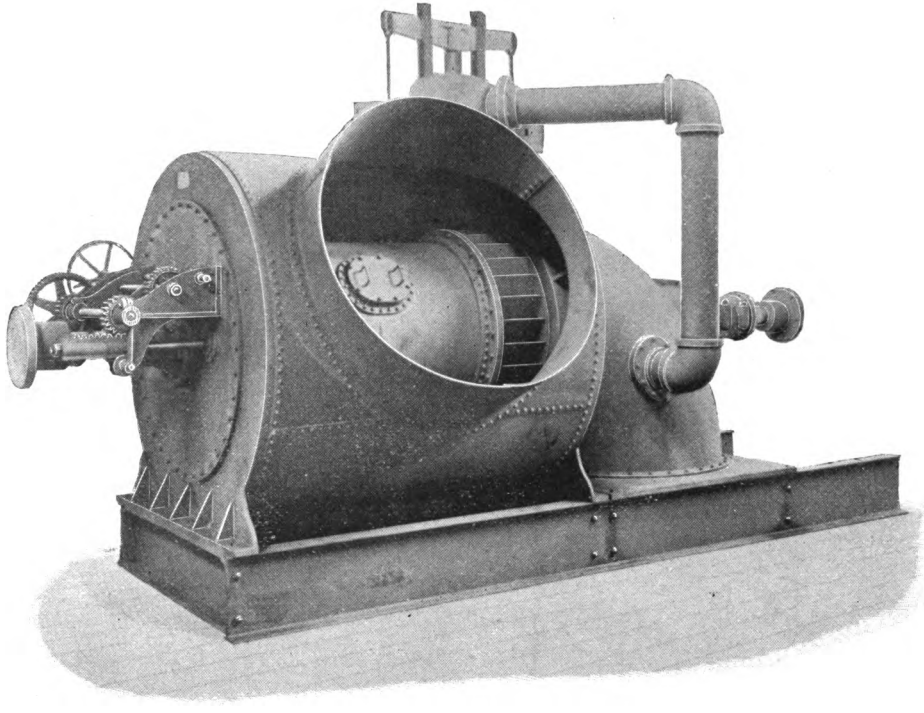

FIG. 74.

Single Special 45-inch Cylinder Gate Victor Turbine. Flume fitted with relief valve. Develops 1,000 horse-power under 66 feet head.

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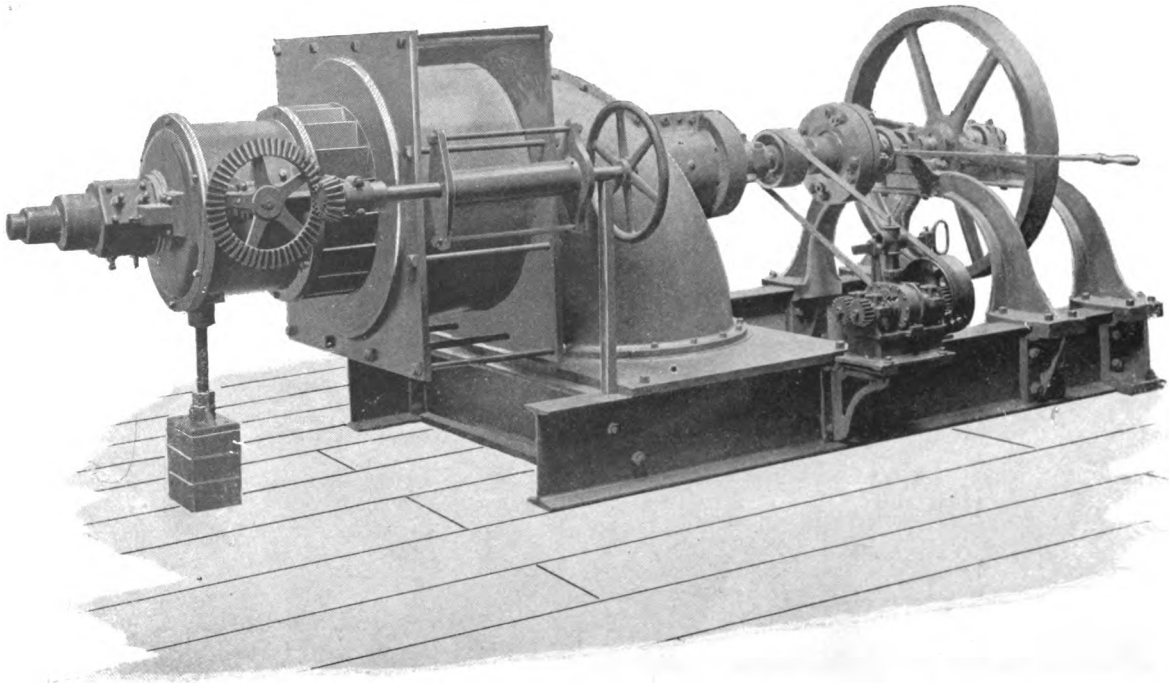

FIG. 75.

Single 15-inch Cylinder Gate Victor Turbine attached to plates, to go in wall, with Worrall Friction Coupling for throwing out pulley. Furnished Fred. Nell, London, England.

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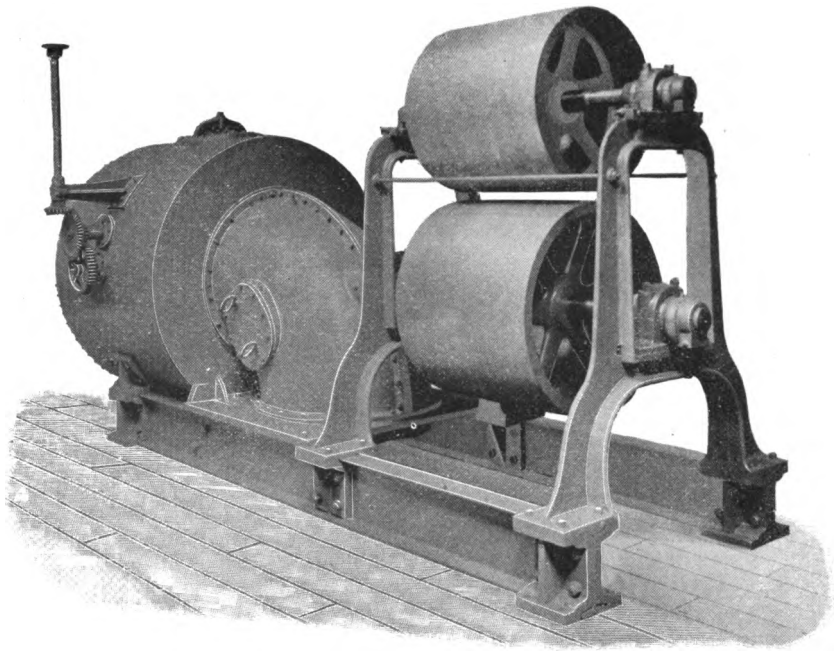

FIG. 76.

Single 18-inch Cylinder Gate Victor Turbine, on horizontal shaft, with pulley and idler. Furnished The Gould Paper Co., Lyons Falls, N. Y. Develops 280 horse-power under 64 feet head.

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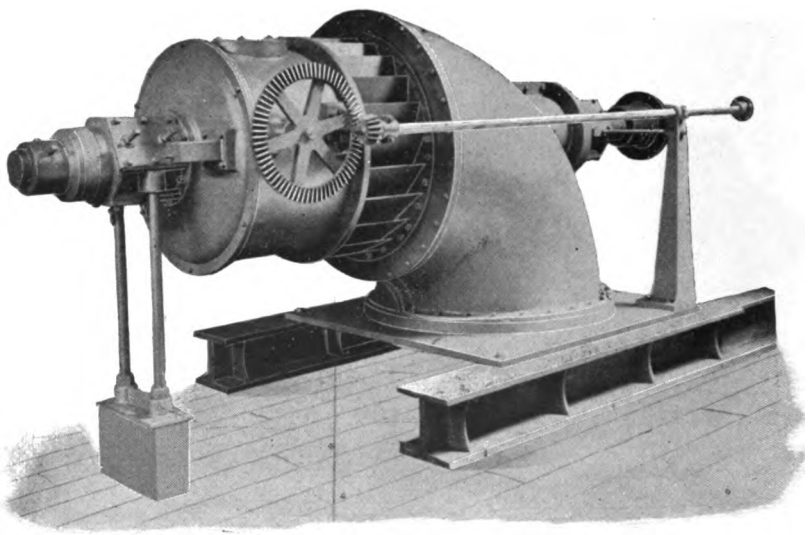

FIG. 77.

SINGLE 30-inch Cylinder Gate Victor Turbine, attached to quarter turn. To go in open flume. Four like this connected to four pairs of 30-inch on center discharge case. Furnished The Webster & Ring Mfg. Co., Orono, Maine. The twelve wheels develop 2,400 horse-power under 26 feet head.

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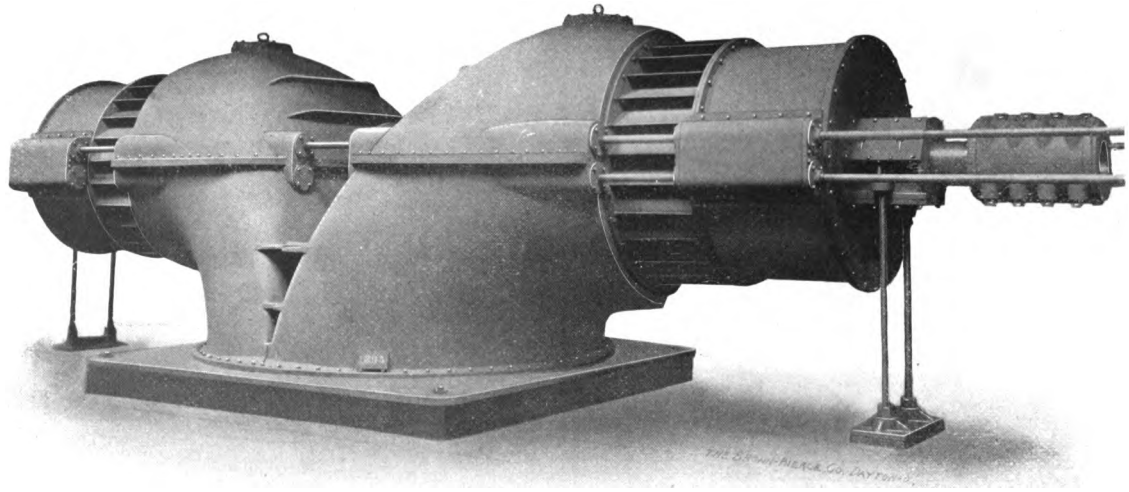

FIG. 78.

Four pairs 51-inch Victor Turbines with our patented Draw Rod arrangement for operating gates, each pair direct connected to electric generator, furnished James River Construction Co., Richmond, Va., 25 feet head.

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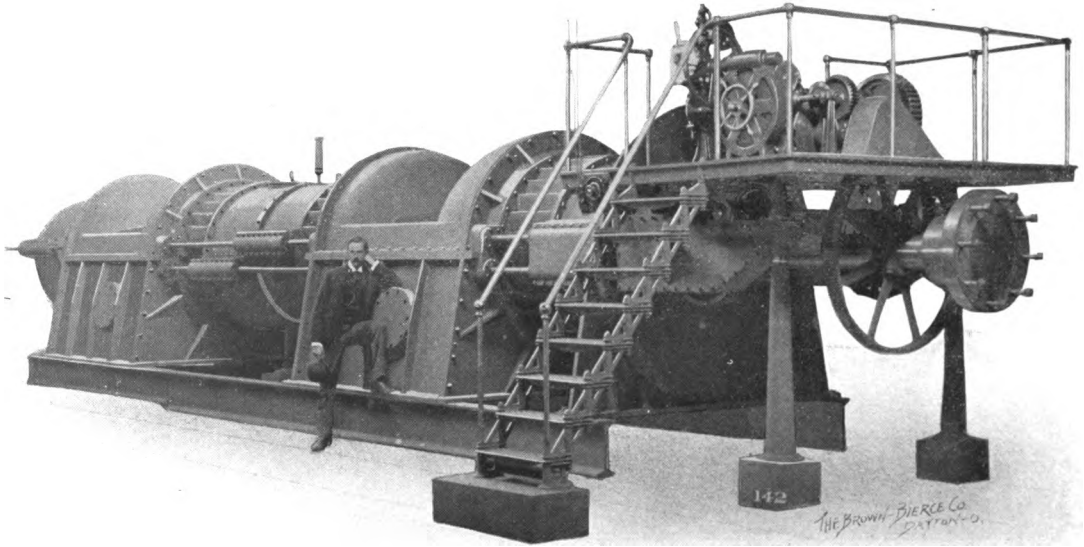

FIG. 79.

Cut shows two pairs Victor Wheels in one unit, with our patent draw rod arrangement for operating Wheel Gates, and Giesler Electro-Mechanical Governor, for direct connection to generator. Seven units like this, each unit consisting of two pairs 42-inch wheels, furnished Hudson River Power Transmission Co., Mechanicville, N. Y. 16 feet head.

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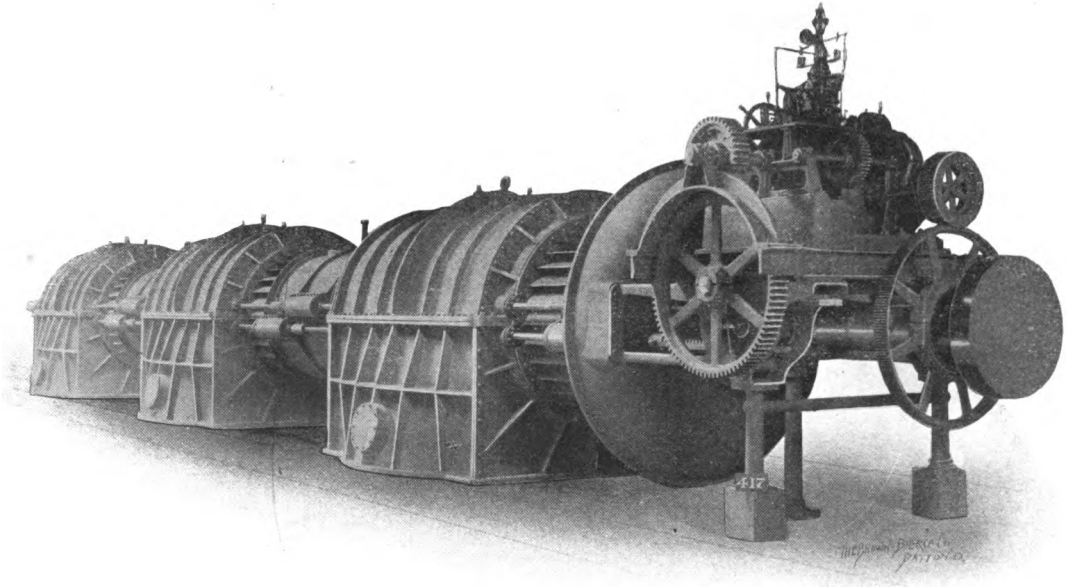

FIG. 80.

CUT shows three pairs Victor Wheels in one unit, with our patent draw rod arrangement for operating gates, each unit arranged for direct connection to electric generator, and regulated by a Giesler Electro-Mechanical Governor. Seven units like this, each unit consisting of three pairs 54-inch wheels, developing 5,000 horse-power under 32 feet head. Furnished St. Lawrence Power Co., Massena, N. Y. Draft tubes, etc., are in place for eight additional units to be put in later, aggregating 75,000 horse-power, which, we believe, constitutes the largest power development at one place in the world.

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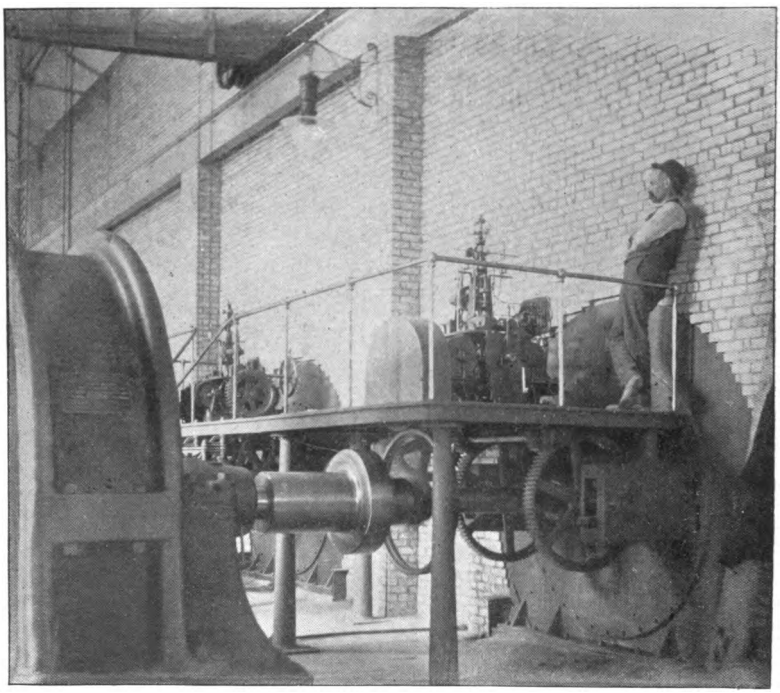

FIG. 81.

INTERIOR of power house of St. Croix Power Co., St. Paul, Minn., (located on Apple River, at Somerset, Wis.) showing four settings of special Victor Wheels operating under 82 feet head. Each Wheel is direct connected to an electric generator, and is controlled by a Giesler Electro-Mechanical Governor.

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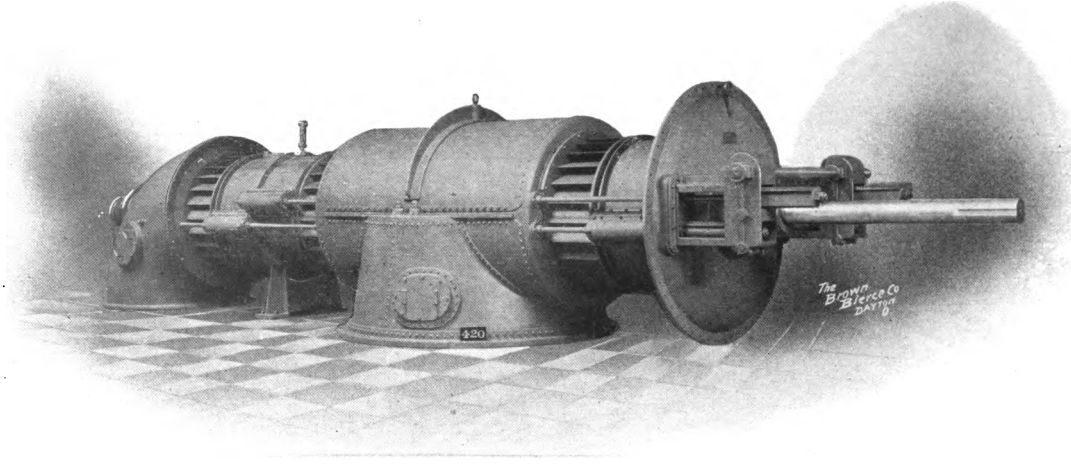

FIG. 82.

This cut shows a unit consisting of one pair and one single Victor Wheels set tandem, arranged for direct connection to generator and provided with our patent Draw Rod arrangement for operating the gates. Three units like this composed of 39-inch Wheels, operating under 28 feet head, furnished The Ottawa Electric Co., Ottawa, Ont., Canada.

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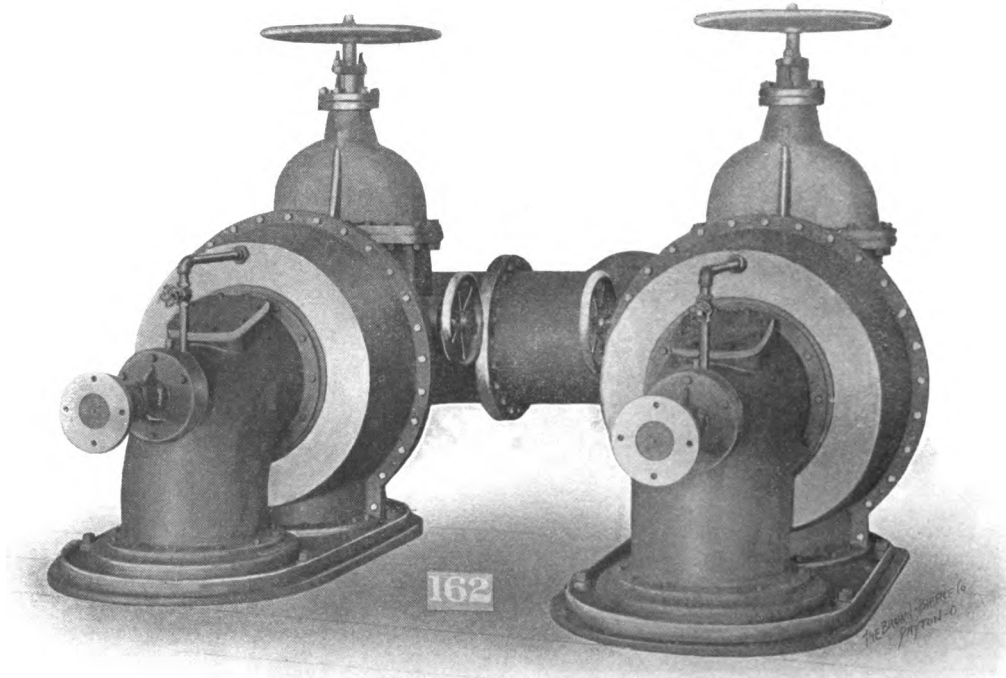

FIG. 83.

This engraving shows two small single Victor Wheels, arranged for direct connection to exciters, furnished West India Electric Co., Kingston, Jamaica, W. I., whose entire water-power plant was designed and furnished by us. The arrangement is very simple, compact and efficient.

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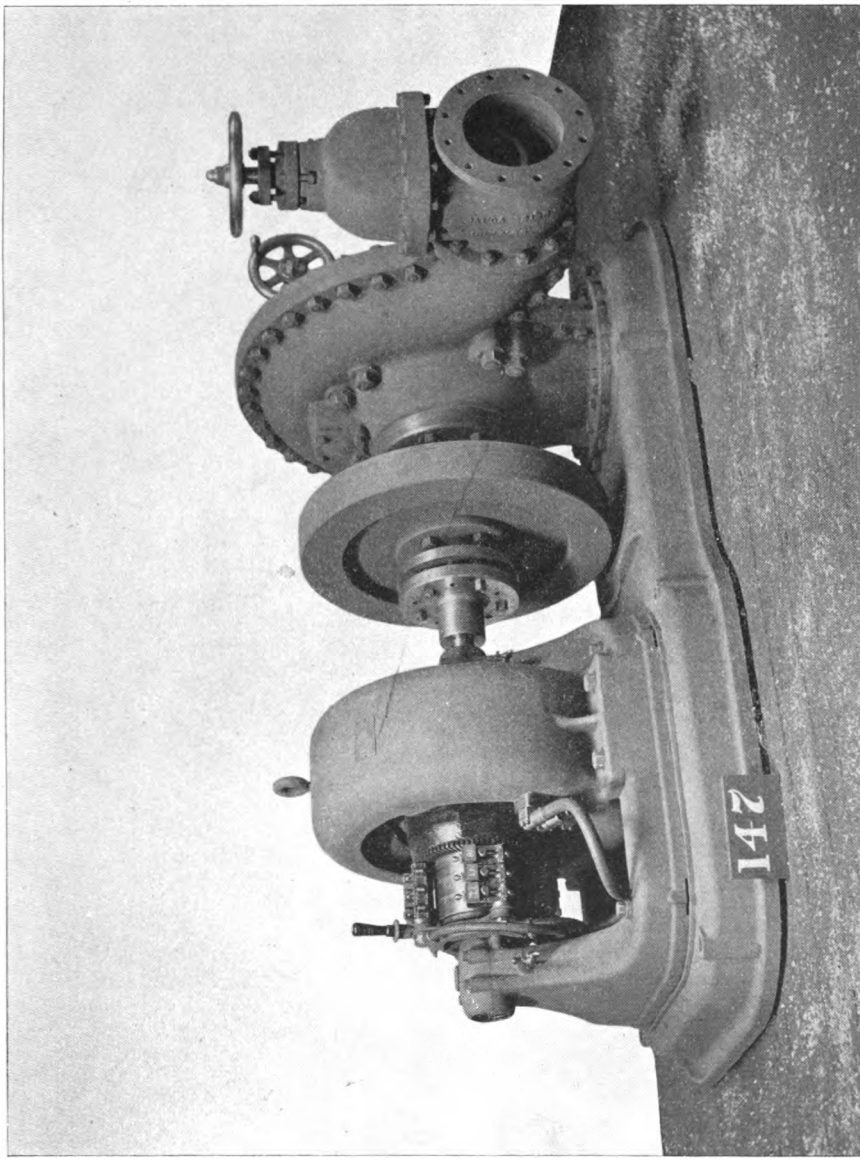

FIG. 84.—Special Type of Victor Turbine, Designed for Use Under High Falls.

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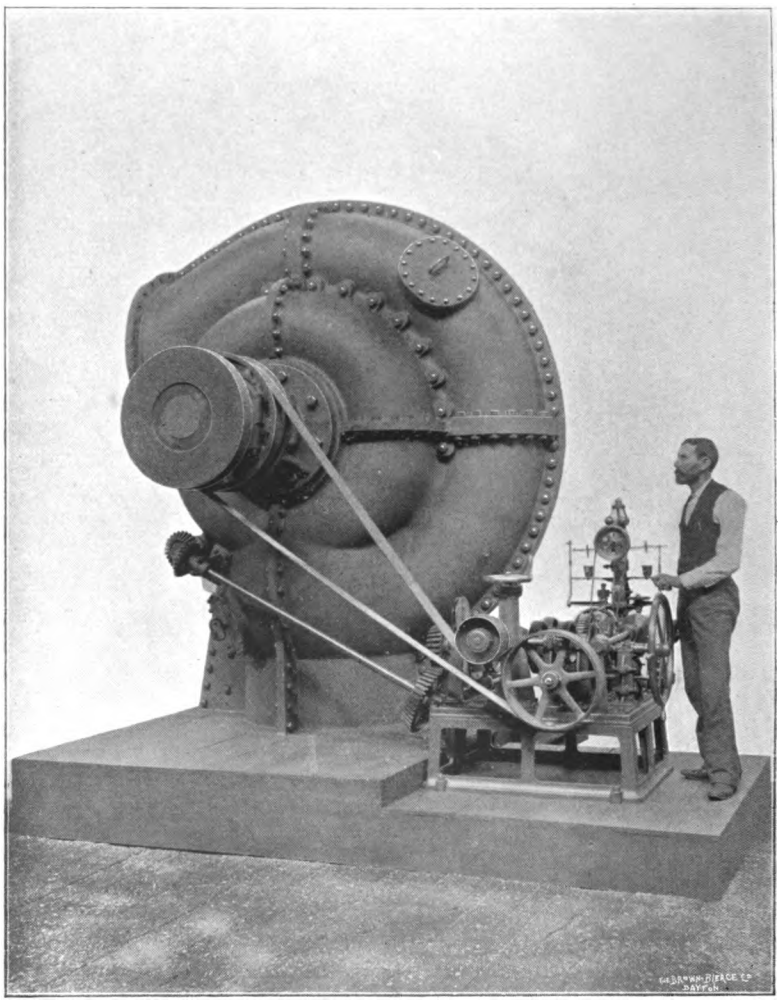

FIG. 85.

Special Type of Victor Turbine, Designed for Use Under High Falls.

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NOTE the extremely simple construction of the wheel, and the strength and durability of all its parts.

The water enters the wheel through a feeder attached to the opposite side of the wheel case from that shown in this engraving (see next page.)

The amount of water is regulated by means of a balanced gate, easily operated and perfectly controlled by the governor, thus insuring close regulation, and this gate is so constructed as to render possible the exceptionally high partial gate efficiency shown in diagram on page 118.

A uniform level of water in the draft tube under varying loads, and which is indispensable to high efficiency, is automatically maintained by our patented devices for regulating the inflow of air.

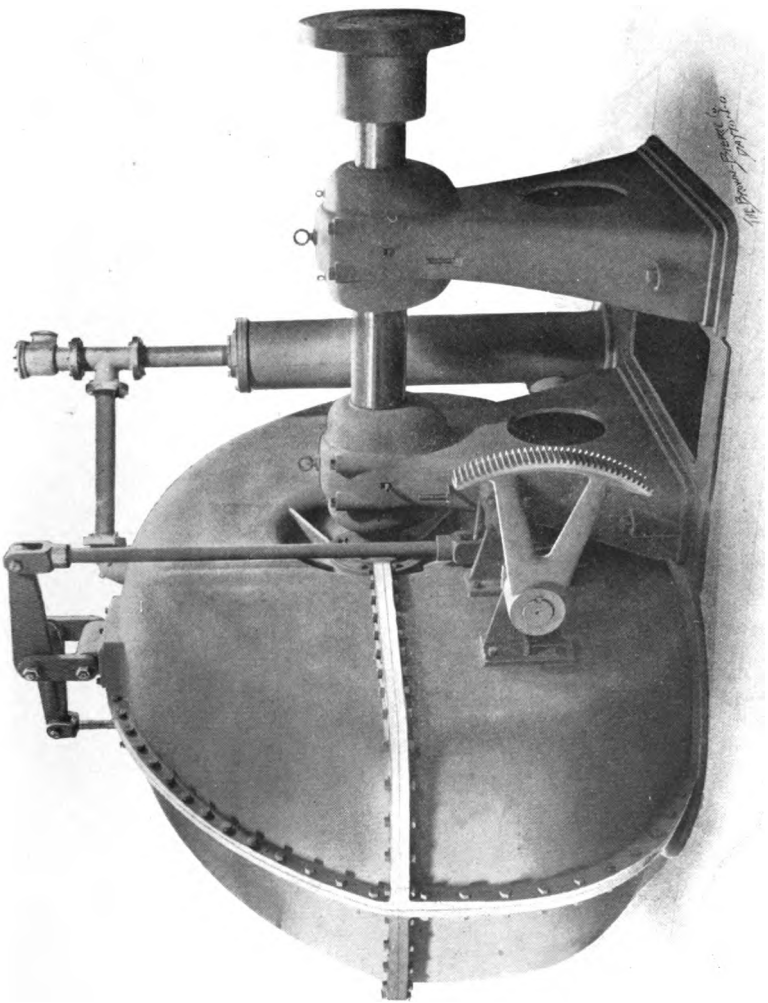

FIG. 86—The Victor High-Pressure Turbine.

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THREE "Victor High-Pressure" Turbines have been installed for The Quebec Railway, Light and Power Co., of Quebec, at their power station, located at Montmorency Falls, seven miles distant. Each Wheel is 54 inches diameter and was guaranteed to develop 1,000 H. P. at 286 r. p. m. under 200 feet head. The diagram on page 118, shows that the Wheel, under repeated and severe tests, exceeded the guaranteed power, and developed an unprecedented efficiency. Particular attention is invited to its remarkable efficiency at partial gate, showing 70.9 per cent. at 2-10 gate. The engraving on this page shows the feeder connection with the Turbine case. See also next page.

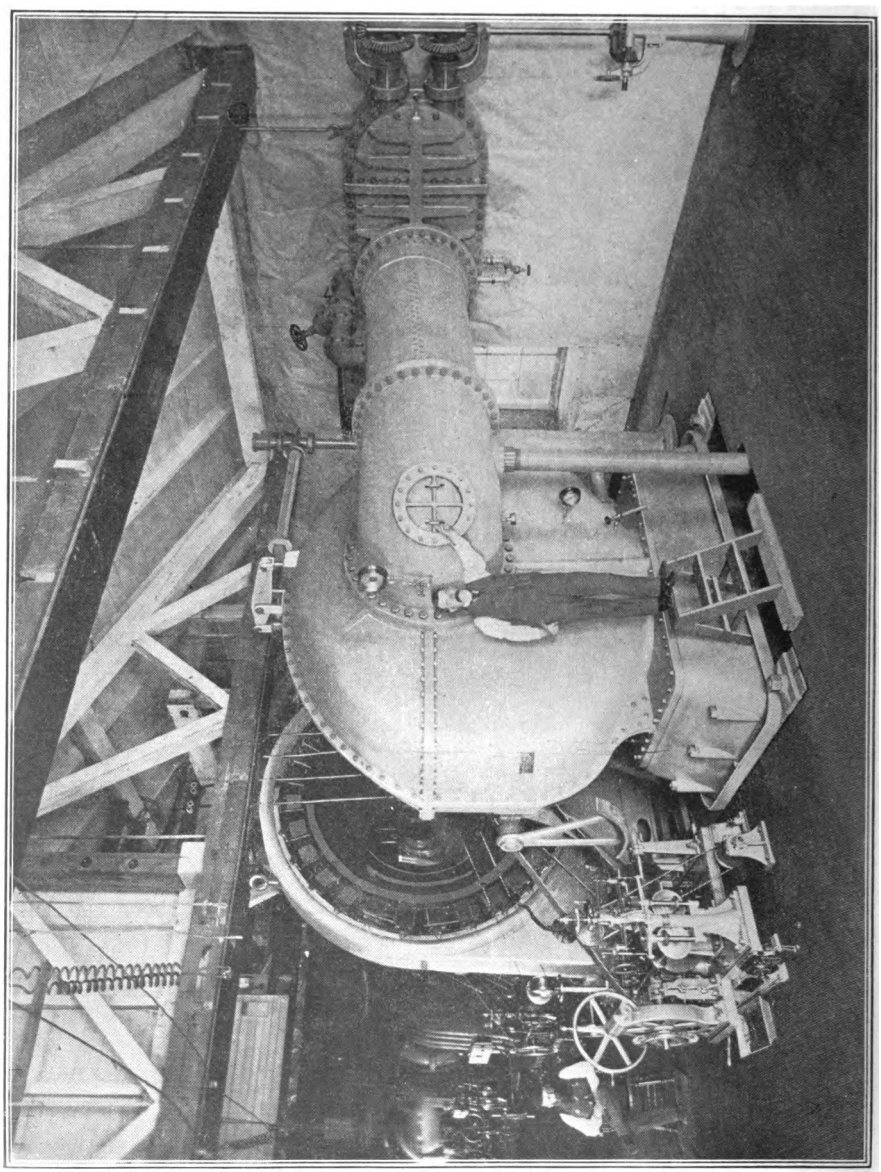

FIG. 87.

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THIS engraving shows the connection between the Turbine and generator, also the Giesler Electro-Mechanical Governor for regulating the speed, and the manner in which it is driven. Each Turbine is regulated by one of these governors, and very close regulation is secured.

Disinterested experts who have examined this plant, and carefully inspected the performance of these Water Wheels pronounce the Victor High-Pressure Turbine an ideal Wheel for use under high heads.

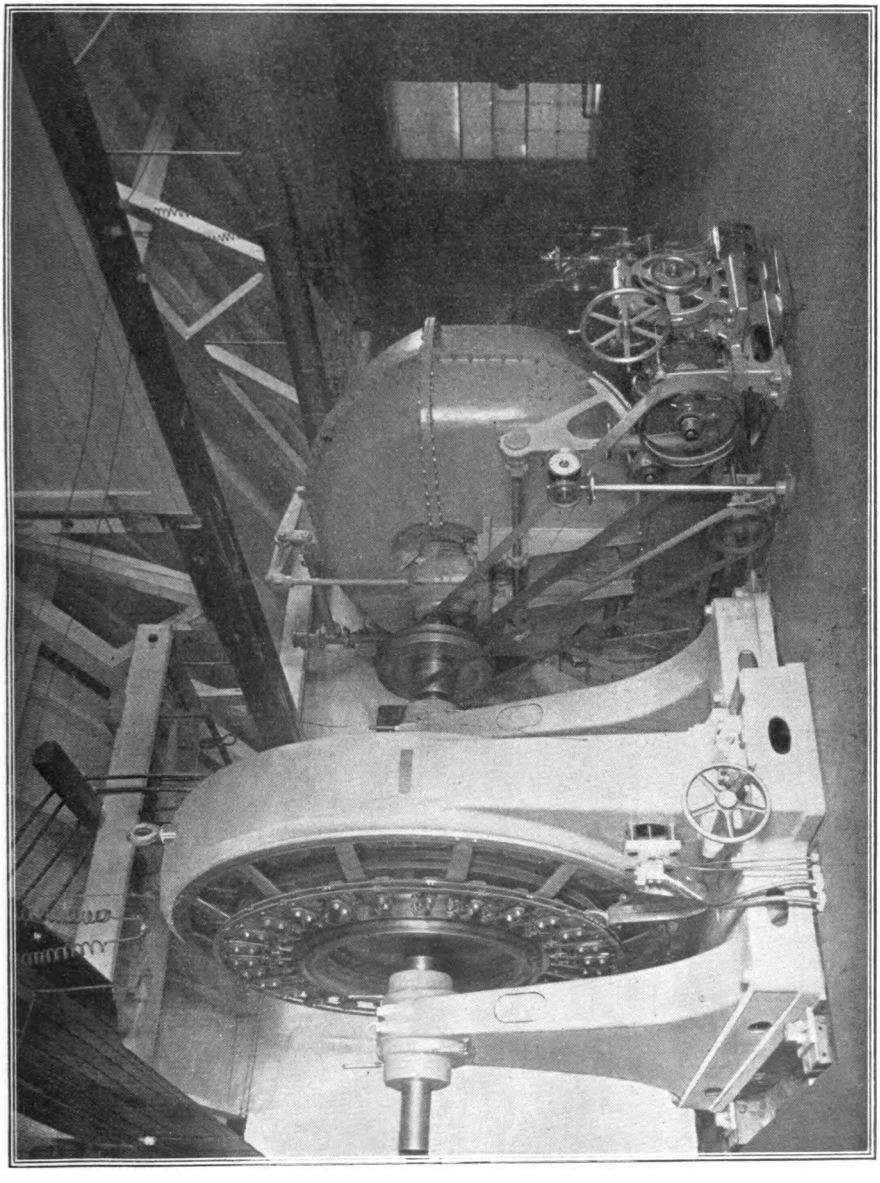

FIG. 88.—1,000 H. P. Victor High Pressure Turbine.

Direct connected to Generator in the power plant of The Quebec Railway Light and Power Co., Montmorency Falls, Quebec.

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THIS diagram is self-explanatory and challenges the attention of all engineers and others interested in the use of water power under high heads.

We believe the average result here shown is unprecedented. Its accuracy is certified to by Mr. Edward A. Evans, member of Canadian Society Civil Engineers, and the Manager and Chief Engineer of the Quebec Railway Light & Power Co., under whose direction the tests were made. We shall be glad to furnish further information concerning this remarkable Wheel to interested parties on application.

THE STILWELL-BIERCE & SMITH-VAILE CO.,
DAYTON, OHIO.

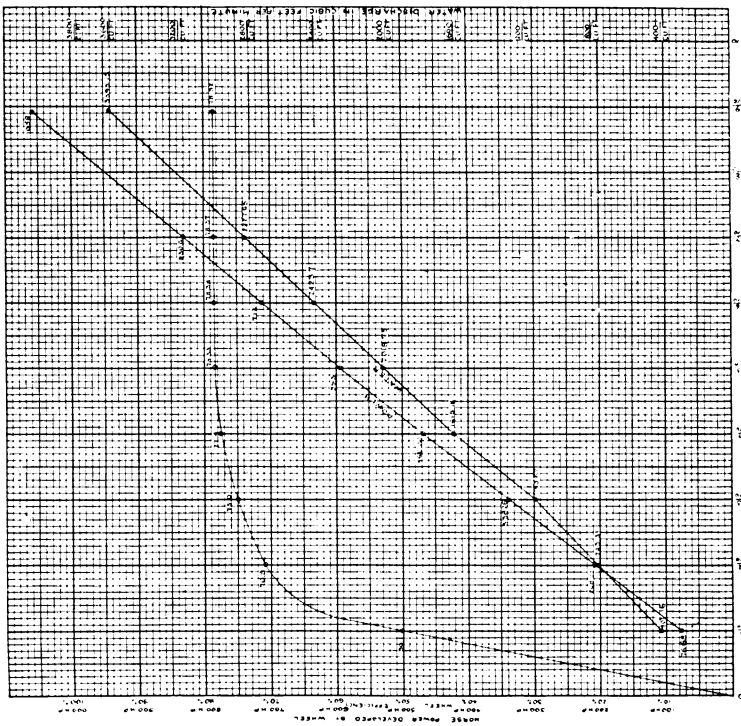
Efficiency curves for N°s Wheel
manufactured by
The Stilwell-Bierce & Smith Vaile Co
of
Dayton Ohio
Tested at the Montmorency Power Station
of the
Quebec Railway Light & Power Co.
Rated capacity 1000 hp under a 185 ft head
Speed 286 Revolutions per minute
Length of Weir 9 15/16 feet
Measuring gauge 18 feet from weir (on still water)
Pressure gauge 108 above level of weir
Head of water during test 198 ft feet
Curves based upon the mean results of
38 different readings up to x gate.
Taken on 4 June to 15 July 1900
Efficiency loss in generator allowed for
Pelham Evans
Asst. Engr. Q.R.L.&P. Co.
Quebec.
Aug. 1900.

Diagram showing power and efficiency of 54-inch Victor High-Pressure Turbine in Power Plant of The Quebec Railway Light & Power Co., Montmorency Falls, Quebec.

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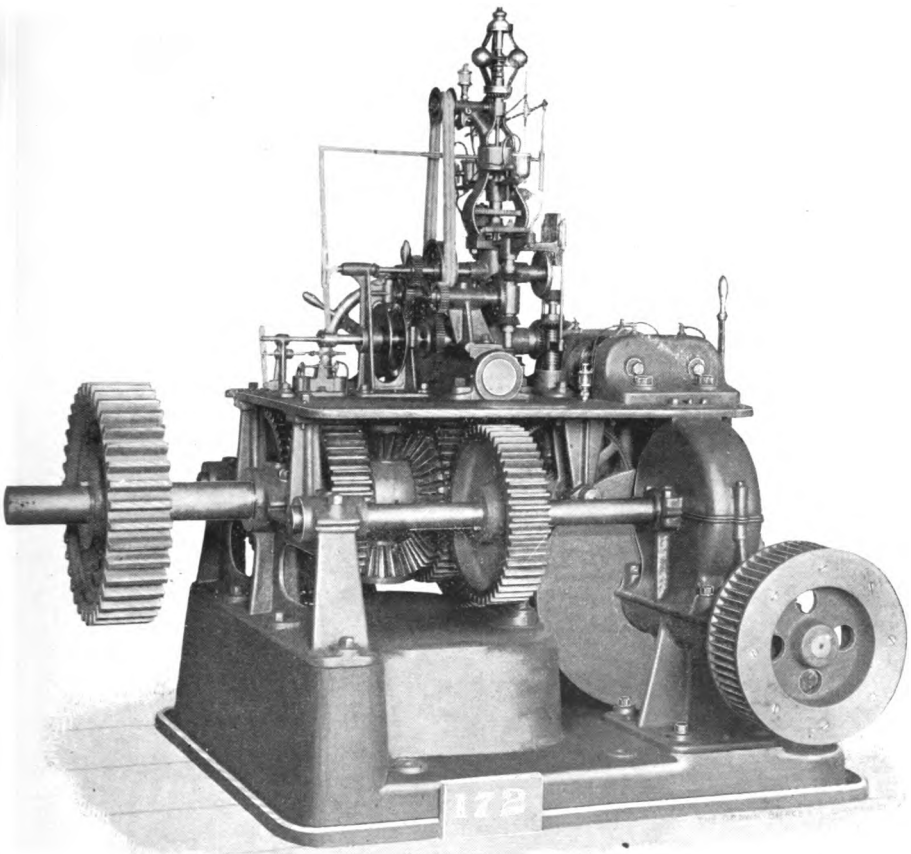
THE LATEST IMPROVED "GIESLER" ELECTRO - MECHANICAL WATER WHEEL GOVERNOR.

Patented December 29, 1896.



STYLE D

Special descriptive circular will be furnished on application to

THE STILWELL-BIERCE & SMITH-VAILE CO.,
DAYTON, OHIO.

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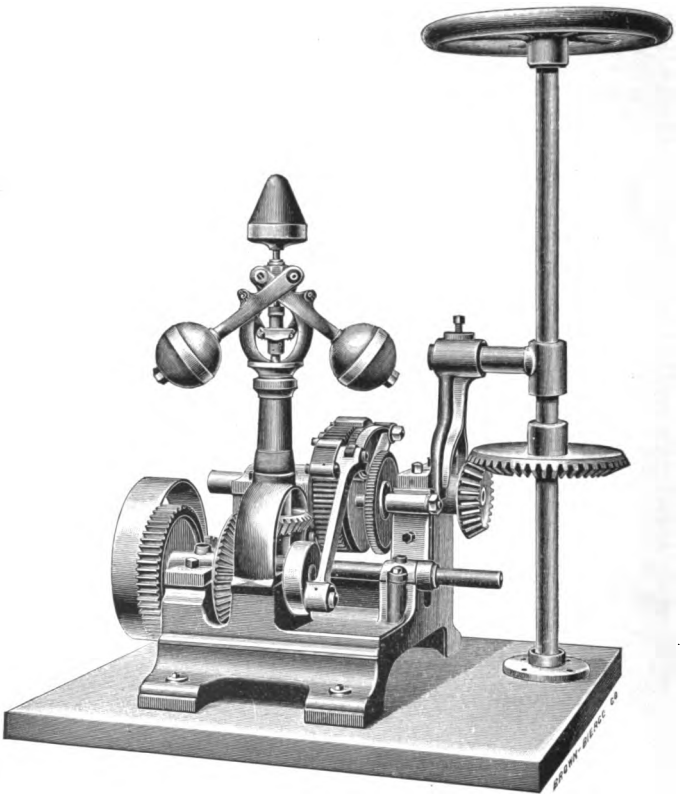
SNOW'S PATENT IMPROVED WATER-WHEEL GOVERNOR.

With Patent Variable Speed Attachment.



WE HAVE had large experience with Water-Wheel Governors, and have adopted the Snow Governor, with our own improvements, herewith illustrated, as being the best of its class. The Governor is of simple and durable construction, very moderate in price, and well adapted to ordinary mill and factory requirements. Special descriptive circulars sent on application.

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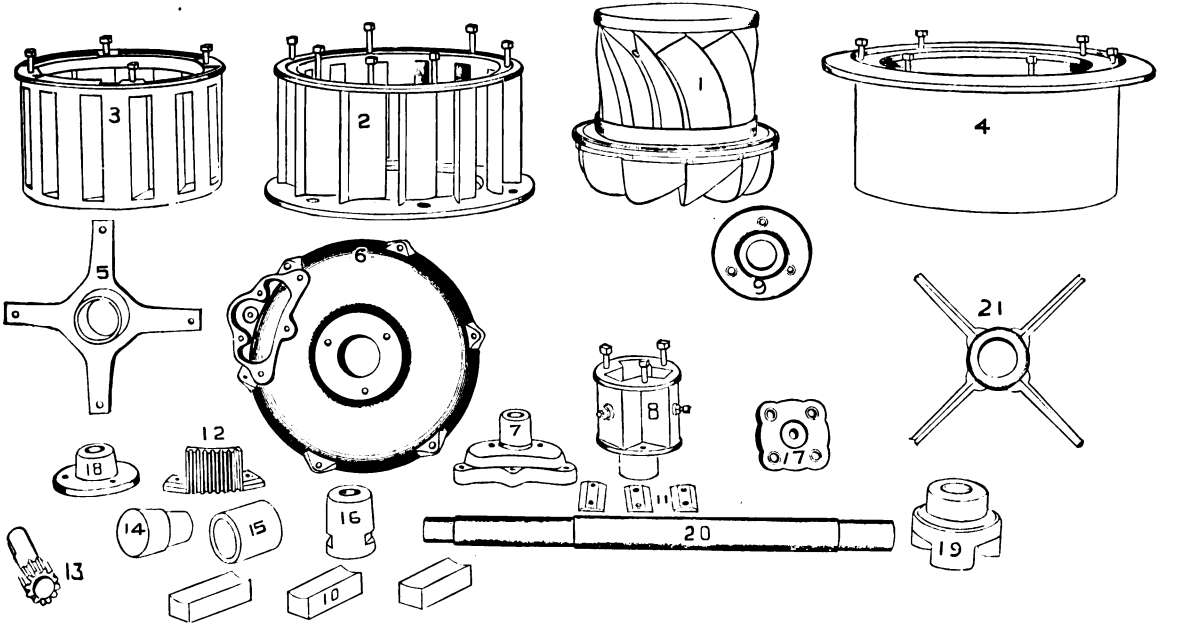
REPAIR LIST FOR "REGISTER GATE" VICTOR TURBINES; UPRIGHT PATTERN.



1, Wheel Runner; 2, Chute Case; 3, Gate; 4, Cylinder; 5, Gate Spider; 6, Crown Plate; 7, Housing; 8, Pedestal; 9, Cover for Pedestal; 10, Wood Follower Blocks in Pedestal; 11, Inside Plates for Pedestal; 12, Rack; 13, Pinion; 14, Wood Step under Wheel; 15, Step Pot; 16, Step Shoe; 17, Plate under Bridgetree; 18, Gate Coupling; 19, Wheel Shaft Coupling; 20, Wheel Shaft; 21, Bridgetree.

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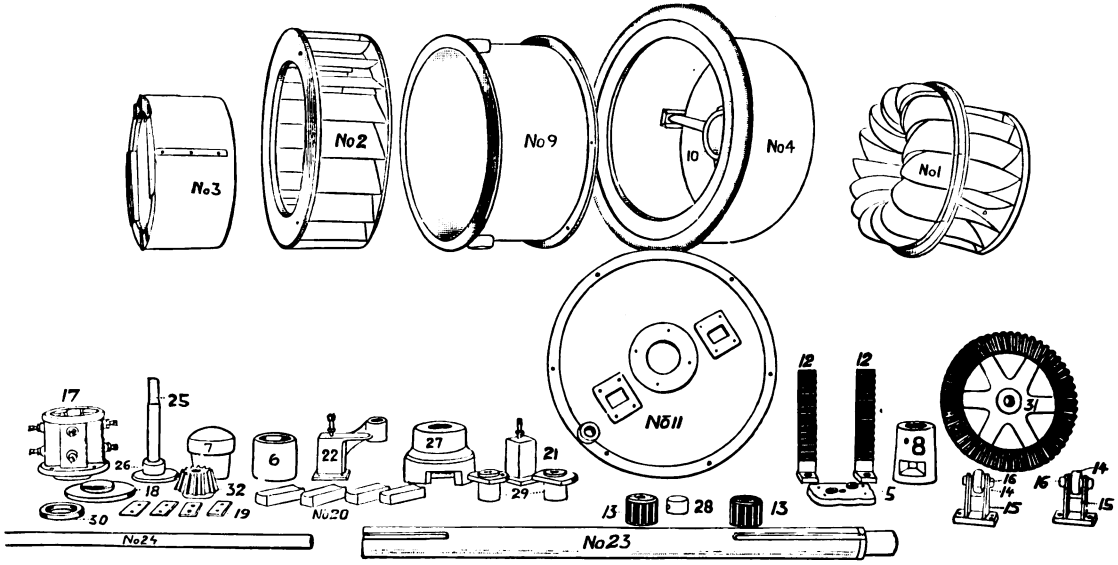
REPAIR LIST FOR "CYLINDER GATE" VICTOR TURBINES; UPRIGHT PATTERN.



1, Wheel Runner; 2, Chute Case; 3, Gate; 4, Cylinder; 5, Plate under Bridgetree; 6, Step Pot; 7, Wood Step; 8, Step Shoe; 9. Dome; 10, Bridgetree; 11, Crown Plate; 12, Racks; 13, Pinions; 14, Back Rolls; 15, Back Roll Stands; 16, Composition Pins; 17, Pedestal; 18, Pedestal Cover; 19, Inside Pedestal Plates; 20, Wood Follower Blocks in Pedestal; 21, Housing for Rack Plain; 22, Housing for Rack with Bearing for Gate Shaft; 23, Wheel Shaft; 24, Gate Shaft in Dome; 25, Gate Shaft; 26, Gate Coupling; 27, Wheel Shaft Coupling; 28, Collar on Shaft in Dome; 29, Gate Shaft Bearings in Dome; 30, Collar between Wheel Hub and Step Shoe; 31, Bevel Gear on Gate Shaft; 32, Bevel Pinion on Gate Shaft.

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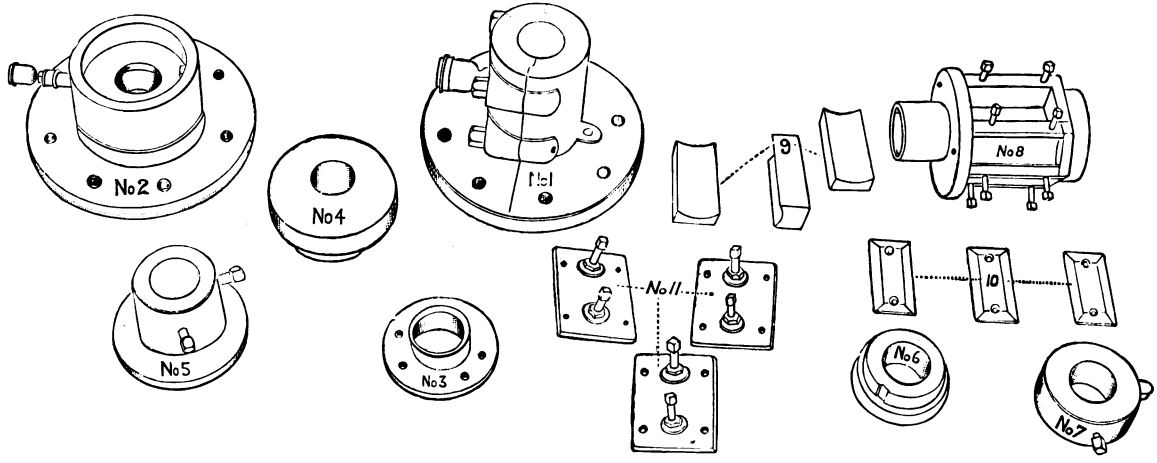
REPAIR LIST FOR HORIZONTAL VICTOR TURBINES.



1, Quarter Turn Bearing; 2, Packing Box; 3, Packing Gland; 4, Wood Step; 5, Step Shoe; 6, Wood Step on Pedestal; 7, Collar; 8, Pedestal; 9, Wood Follower Blocks in Pedestal; 10, Inside Pedestal Plates; 11, Outside Pedestal Plates.

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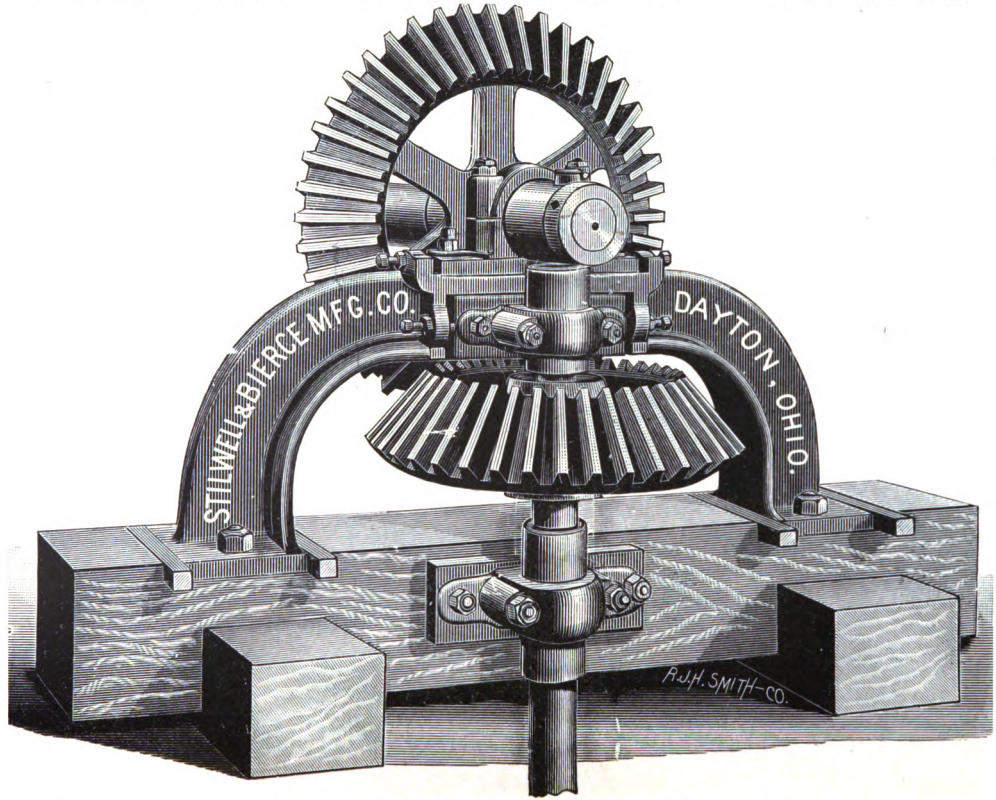
CAST-IRON YOKE, WITH ADJUSTABE BEARINGS FOR HOLDING BEVEL GEARS.



Prices for these Yokes, and also for all descriptions of Gears and other Power Connections, including Grooved Pulleys for rope transmission, will be quoted on application. Our Gear Patterns are all new and designed to meet the severe requirements of modern engineering.

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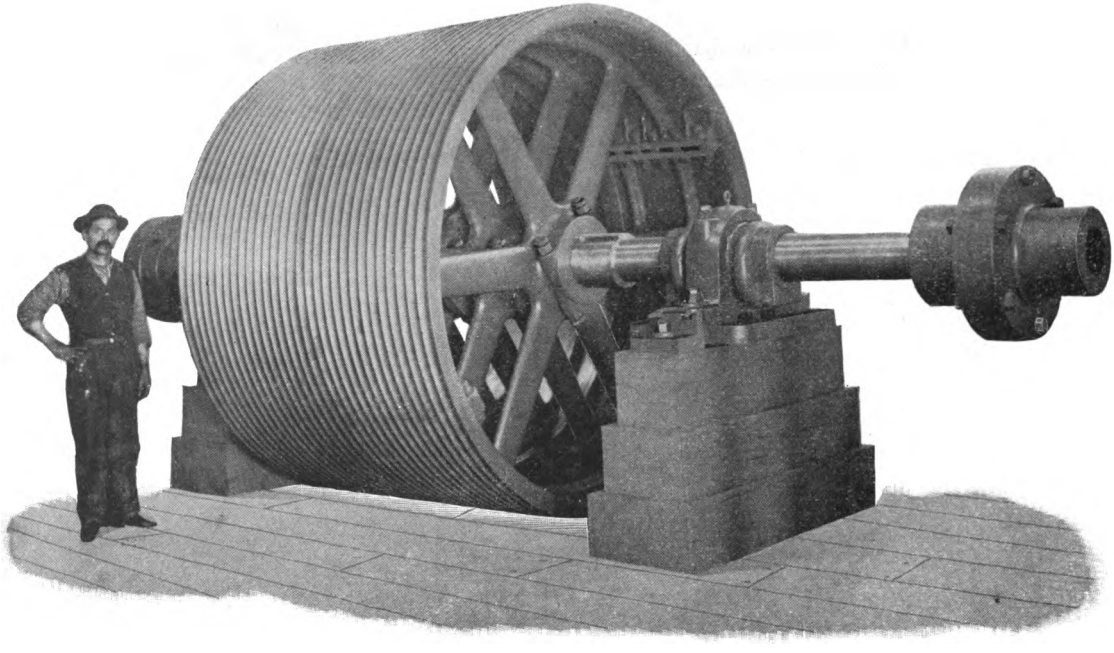

Large Rope Pulley, with shaft and boxes. Pulley 10 feet diameter, and grooved to carry twenty-two $1\frac{3}{4}$-inch ropes. Furnished The Lockhart Mills, Lockhart Shoals, S. C.

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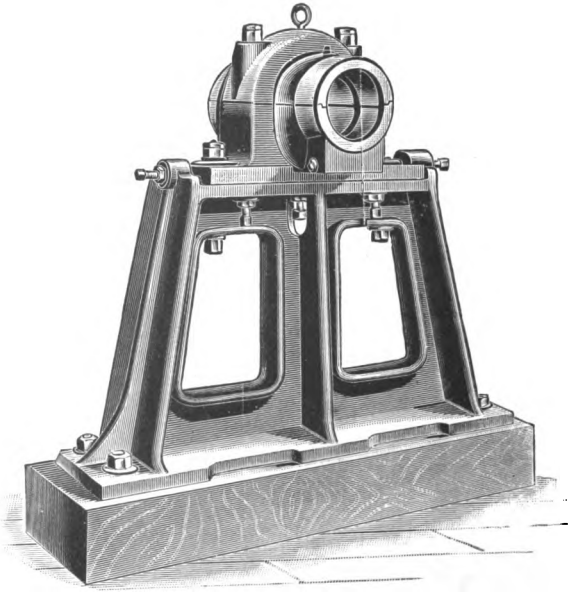

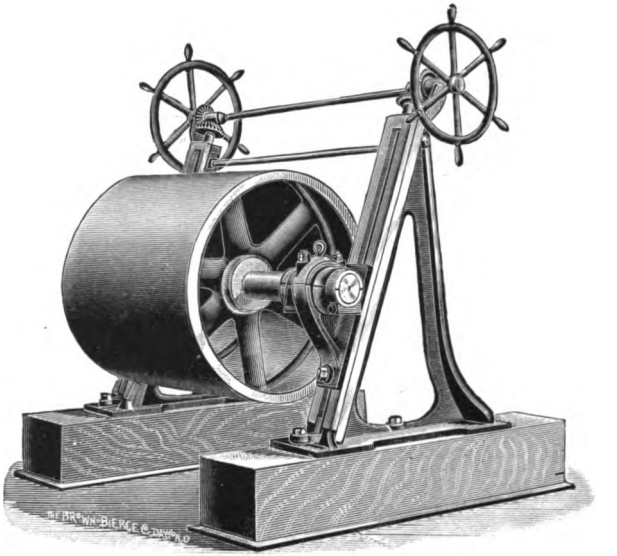

Our Line of Patterns for Power Transmitting Machinery is very extensive and complete, and strictly up-to-date, and all of our work in this line is of the highest grade. Prices cheerfully quoted on receipt of specifications.

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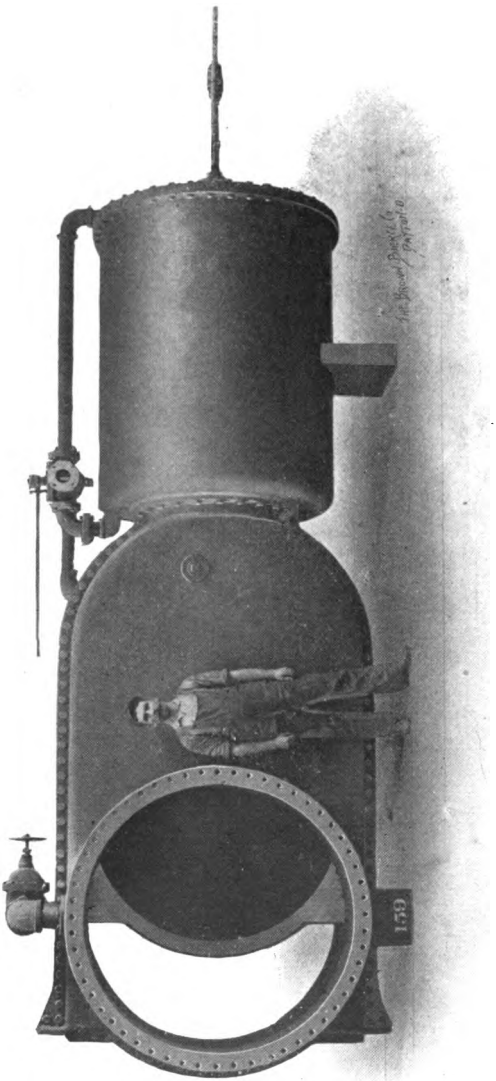

Straight-Way Water Gate, Piston Pattern. Operated by hydraulic pressure.

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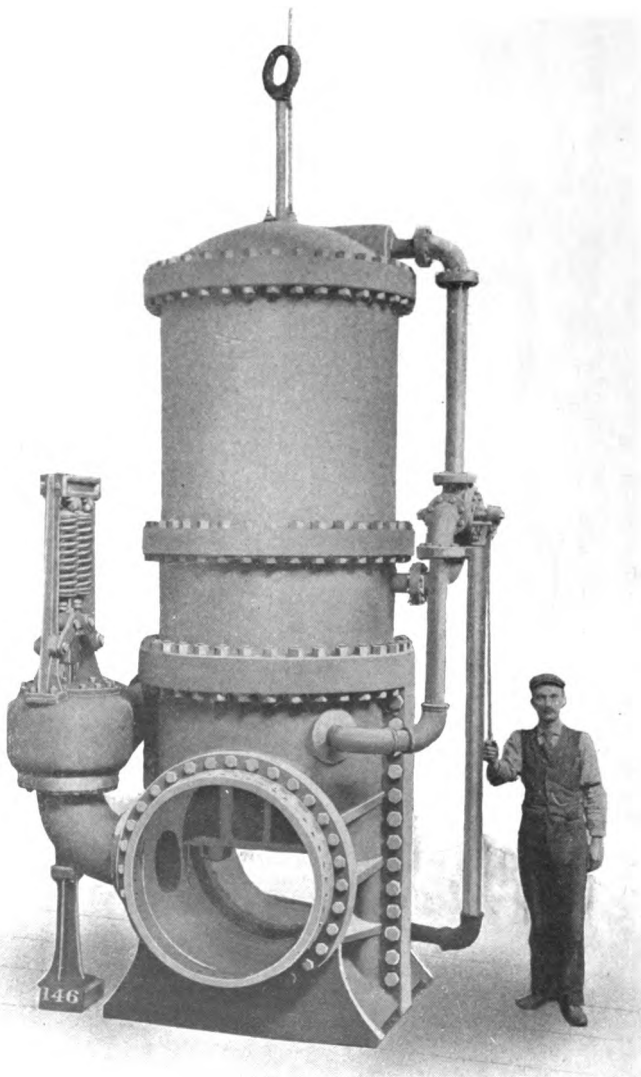

Straight-Way Water Gate, Piston Pattern, with Spring Relief Valve. Operated by hydraulic pressure.

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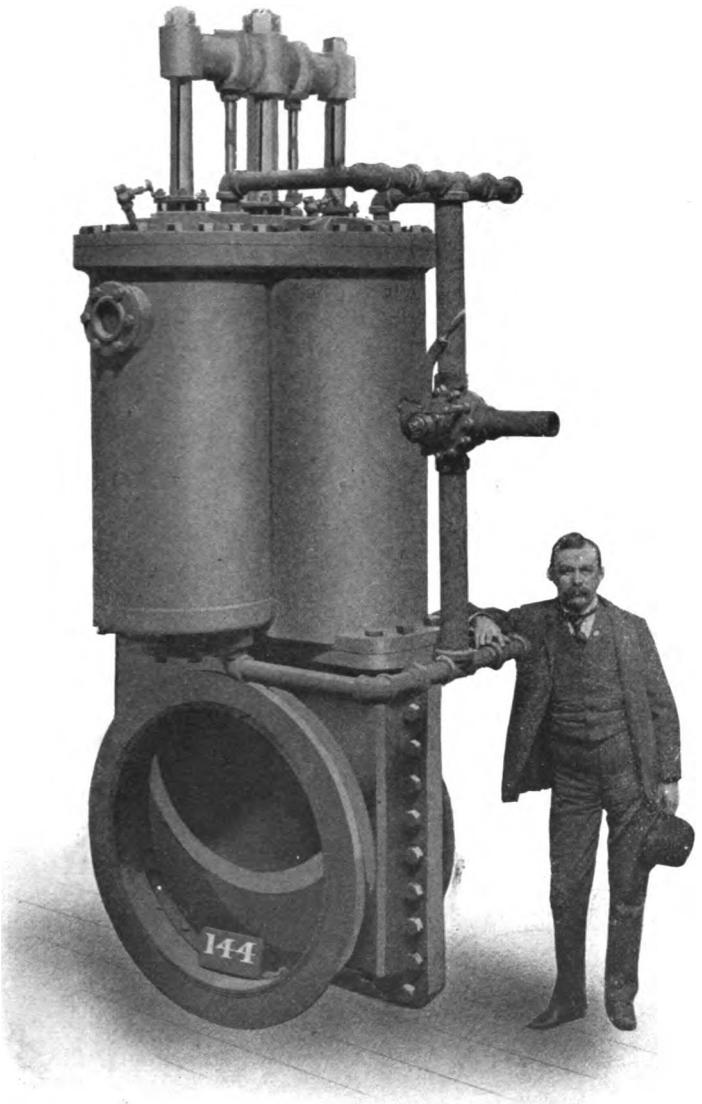

Straight-Way Water Gate, Piston Pattern. Operated by three hydraulic pistons.

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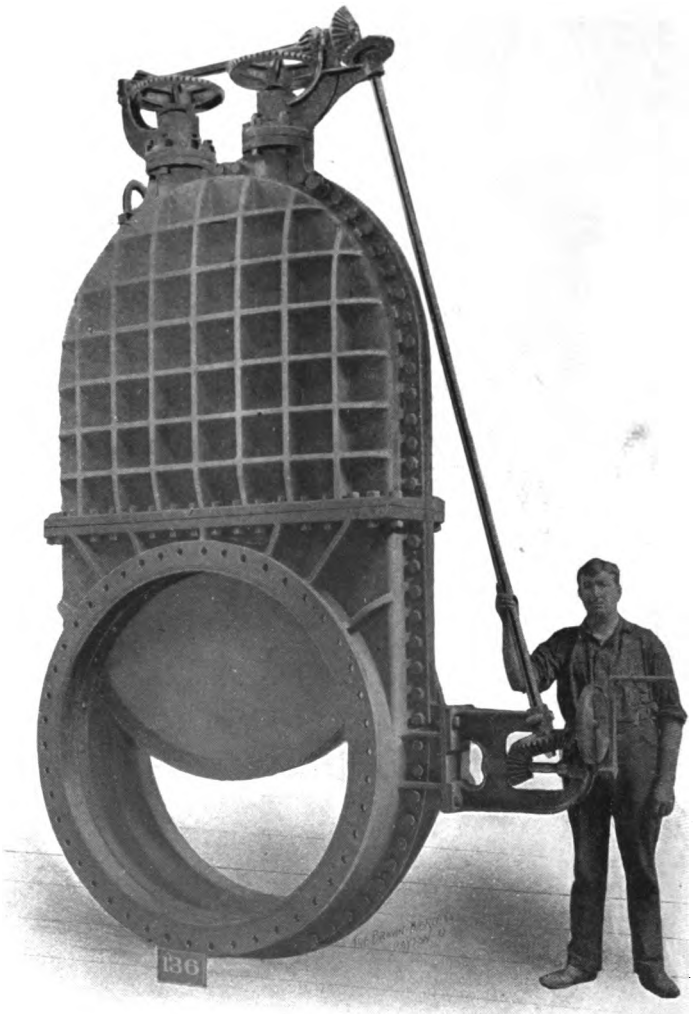

Straight-Way Water Gate, screw pattern, operated by two brass screws. See same pattern single screw, in connection with Water Wheel settings, Figs. 40, 41 and 42.

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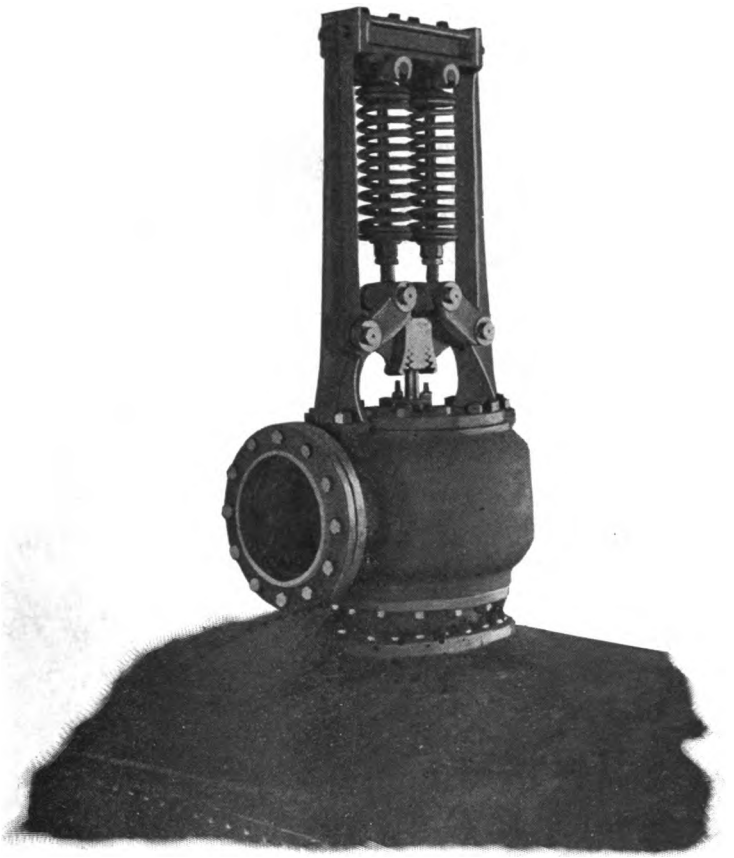

Relief Valve, Spring Pattern, for use on Feeders, Flumes, etc. See Water Wheel (Fig. 74), for Relief Valve, provided with weights instead of springs.

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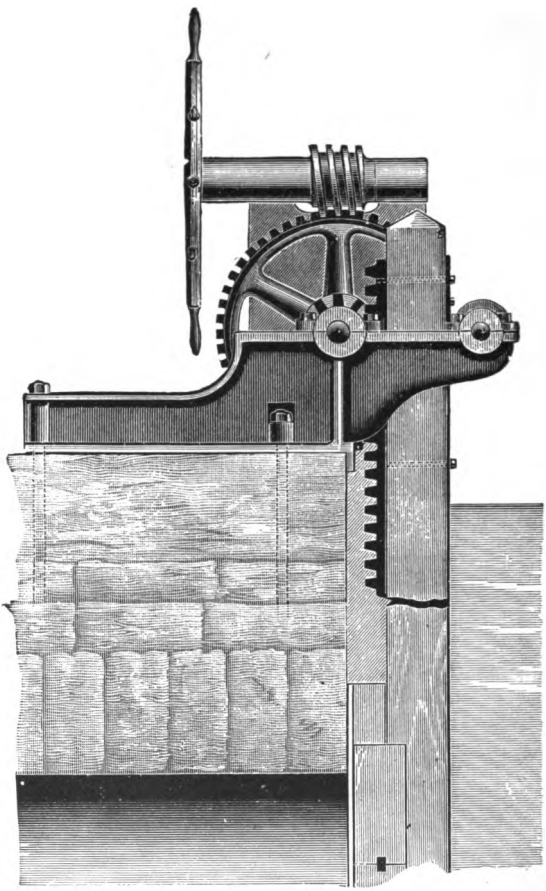
HEAD GATE IRONS, No. 1.



NO. 1 is side elevation of Worm and Gear Hoist, where the gate is on the face of the masonry or bulk-head.

We make this style for one or two stems, and of different weights.

Prices quoted on application.

We wish to impress upon owners of water powers the necessity of providing good substantial Head Gates, with reliable apparatus for operating them. The necessity for shutting the water out from the forebays or feeders supplying the Water Wheel is liable to arise at any moment, and if the Head Gates are out of order and cannot be quickly operated, great loss or damage may ensue. Cheaply constructed Head Gates, without suitable irons, are poor affairs, and almost sure to fail when most needed. We illustrate herewith several different designs of Head Gate Irons, which we are prepared to furnish.

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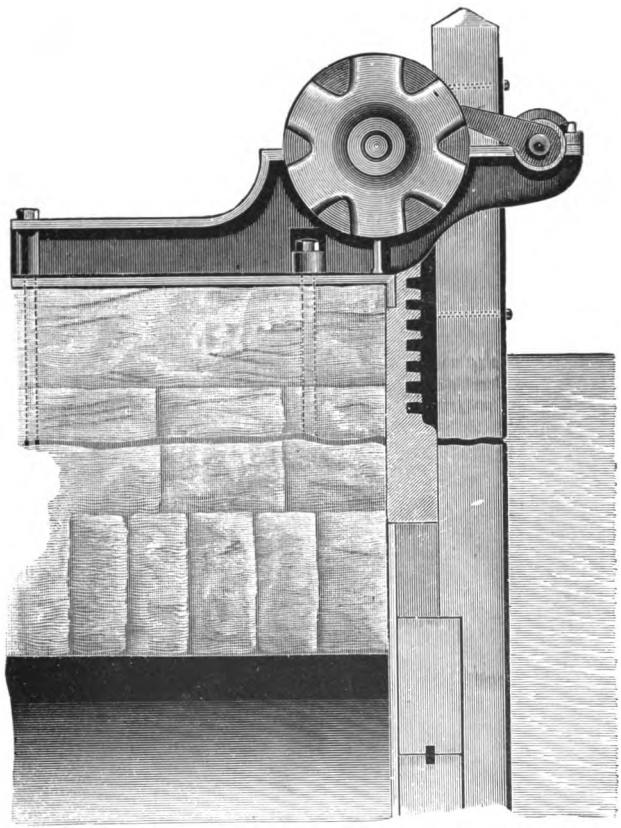
HEAD GATE IRONS.—No. 2.



No. 2 is similar to No. 1, except that a Winch Wheel and Lever is used instead of Worm and Gear.

Prices quoted on application.

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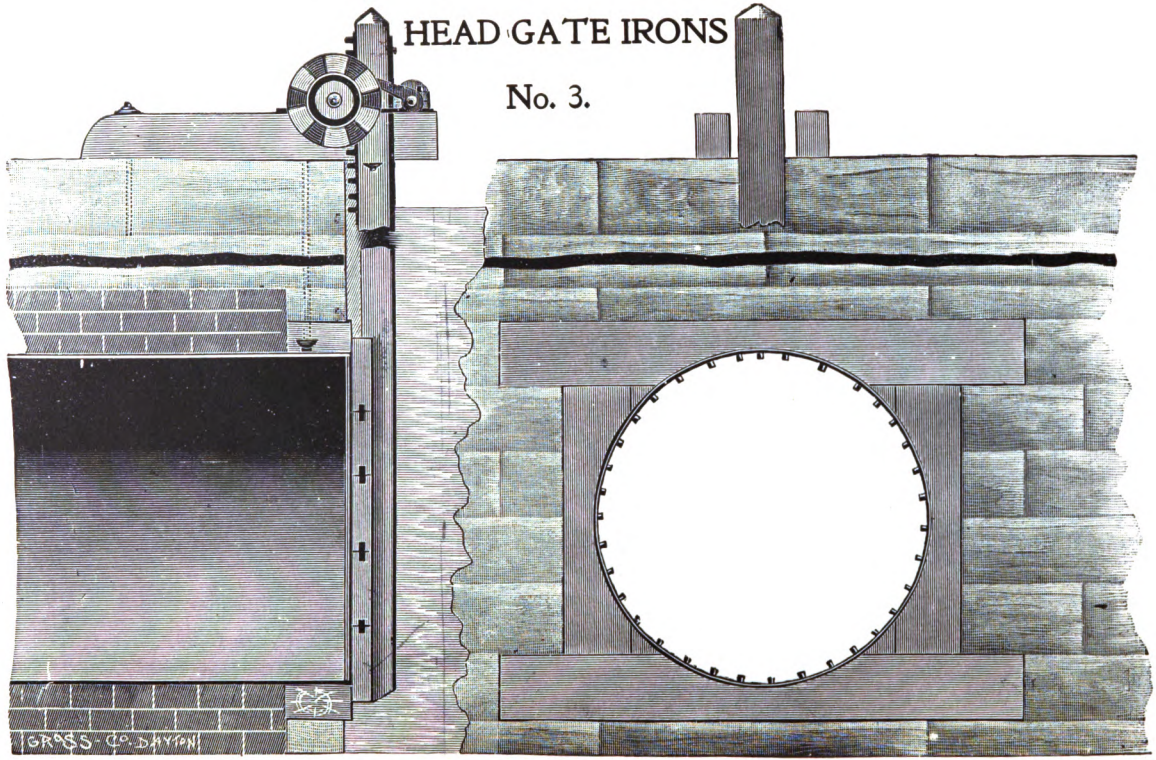
HEAD GATE IRONS

No. 3.



No. 3 shows a sectional and front elevation of a Winch Wheel and Lever Hoist, with gate on the face of the masonry. It is similar in operation to No. 2, but is a much cheaper arrangement. Prices quoted on application.

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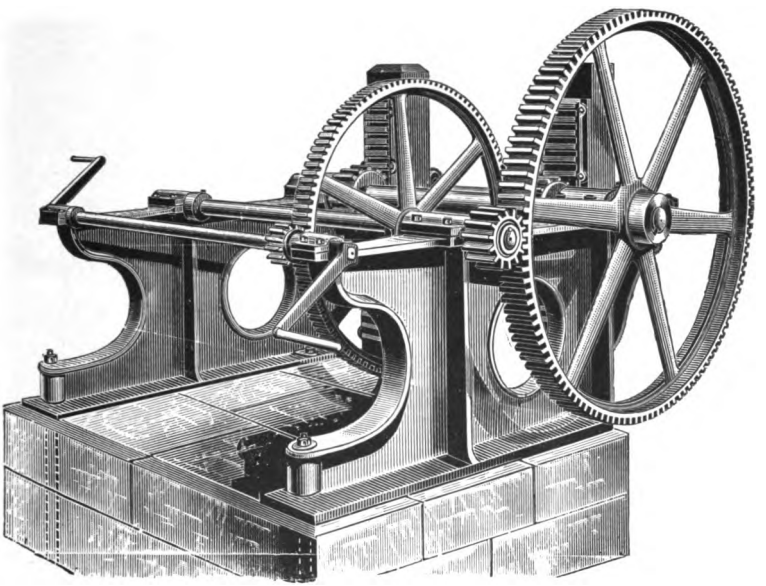
HEAD GATE IRONS, No. 4.



SPECIAL design of extra strength, made for the Rumford Falls Water Power Co., Rumford Falls, Me., to hoist a gate 8x10 feet, under 24 feet of water.

Prices quoted on application.

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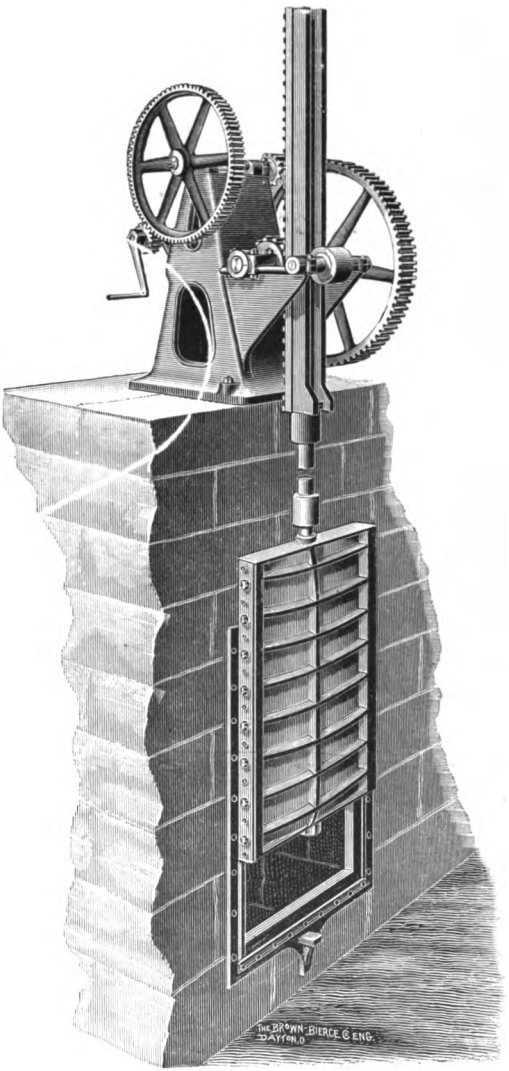
HEAD GATE IRONS, No. 5.



ENGRAVING shows No. 5 Head Gate Irons. A special design of great strength, with which one man can raise a large gate under a high head of water. The engraving also shows our latest

IMPROVED WASTE GATE

and the manner of attaching Head Gate Irons to it.

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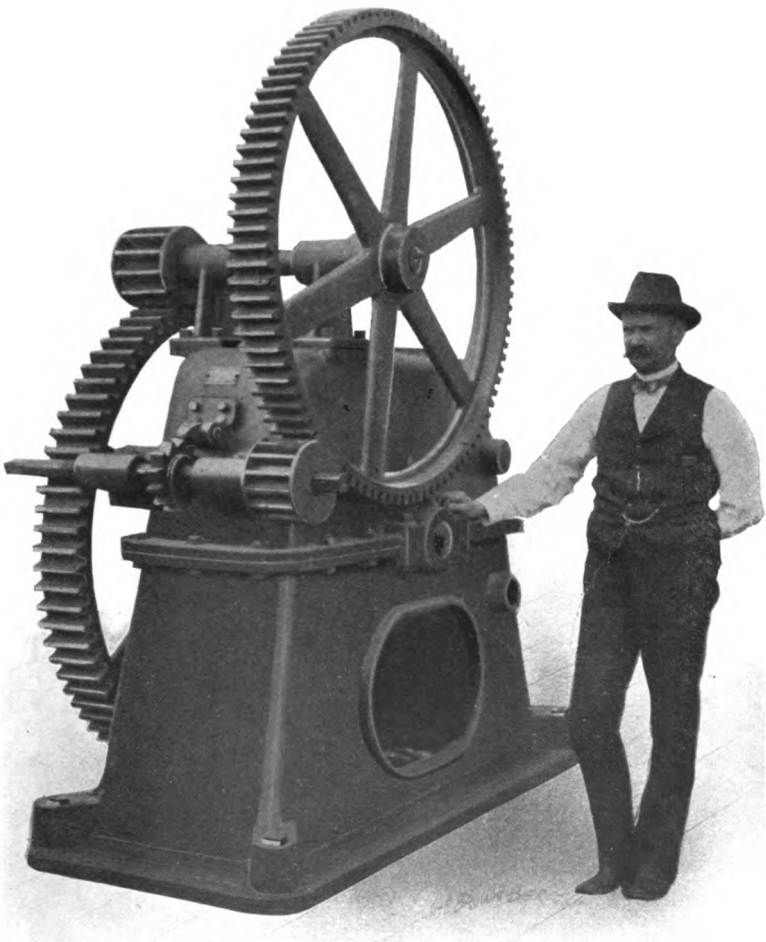
No. 7 HEAD GATE IRON.



Special design of great strength and power, in which the rack and pinion operating the Gate are completely housed, thus preventing breakage by ice or other obstructions.

Prices quoted on application.

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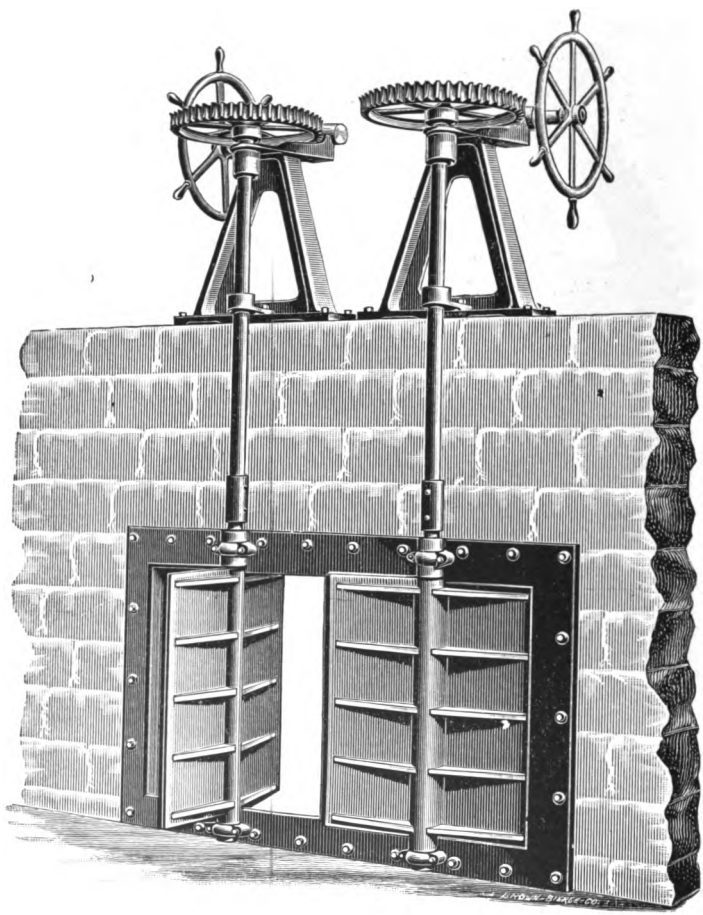
HEAVY WASTE GATES AND OPERATING GEARS.

PATTERN No. 9.

For Dams, Canals, Etc.



Prices on application.

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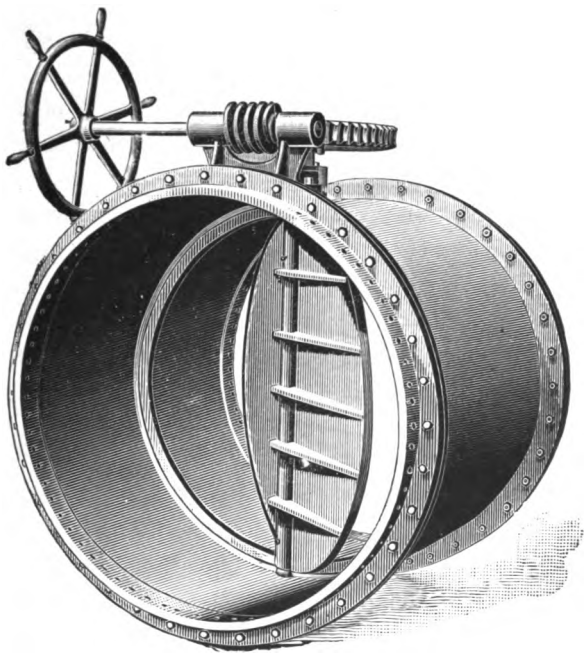
WICKET GATES.



We are prepared to furnish Wicket Gates of the above design in sizes ranging from 24 to 72 inches diameter.

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INSTRUCTIONS FOR SETTING WHEELS.

THE majority of competent millwrights are perfectly familiar with the proper manner of setting Turbine Wheels, and as the VICTOR requires no conditions not essential to all Turbines of this class, instructions to them will hardly be necessary; but for the information of inexperienced persons, and to guard against any misunderstanding or failure in putting Wheels in properly, we have thought it best to lay down some plain general rules by which they shall be governed in setting the Victor Wheel.

This is a flume Wheel, constructed to rest by the flange of its case or stationary part upon the floor of the flume, over an aperture in the floor, through which the water is discharged.

No particular form of flume is required, but whether round or square, its internal diameter should not be less than stated in column C in Table of Dimensions, page 16.

In erecting a flume to receive the Wheel, the first thing to be done is to excavate a wheel pit of sufficient depth, and, unless it has a rock bottom, put down mud-sills and sheet over the bottom of the pit with two-inch planks. For the smallest Wheels this pit SHOULD NEVER BE LESS THAN TWO FEET DEEP OF CLEAR DISCHARGE BELOW THE END OF CYLINDER OR DRAFT TUBE, AND FROM THAT TO EIGHT FEET IN DEPTH, according to the size of the wheel and head under which it operates, and of sufficient width to comply with the rules stated on pages 143–144. This pit should be extended out into the tail race ITS FULL WIDTH AND DEPTH FOR SEVERAL FEET BEYOND THE OUTSIDE OF THE FLUME, and then gradually sloped upward to the general level of the bottom of the tail race. Too much importance cannot be attached to this matter of providing ample space for the wheel to discharge into, for if there is not ample space under the Wheel to admit of the water passing away from the Wheel QUIETLY and EASILY; it will react upon the Wheel and seriously interfere with its performance.

On page 17 we present a vertical section of an ordinarily constructed wooden flume, with the Wheel in position, showing the pit under the Wheel, and the mud-sills and sheeting, which, as before stated, should always be put down unless the pit has a rock bottom. The cut is so simple and plain as to readily explain itself. The frame and floor of the flume should be strengthened by as many intermediate

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sills and posts as its size may require. Leave a square in the bottom of sufficient size to receive the cylinder or draft tube of the Wheel, and spike corner pieces into this square to assist in supporting the Wheel. We urge upon millwrights and mill owners particular care in the construction of the lower timbers and floor of the flume; for, if the floor and frame are not of sufficient strength to support the enormous load generally imposed upon it, but springs or sags down under the pressure, the Wheel is thereby thrown out of plumb, which seriously interferes with its proper performance. Light or weak timber should never be used for the bottom or frame of flume. The sills should be at least two inches larger each way than the corner posts.

The floor timbers should be placed in the direction of the current, with their upper surface low enough to insure the end of the cylinder being submerged at least two inches in STANDING tail water, when at its lowest stage.

The intermediate sills may be narrower one way than the other, and should be placed edgwise; and in large flumes, EACH CORNER OF THE SQUARE OPENING left in the frame of the floor to receive the cylinder of wheel case should be supported by a three or four-inch square post made of HARD, STIFF TIMBER or small iron columns, placed solidly on the foundation, but NEVER PLACE ANY SUPPORT UNDER THE WHEEL. Cover the bottom of the flume with three-inch plank, and line up the sides with two-inch plank. After cutting out the hole in floor of flume to receive the wheel case, get out pieces of wood skirting two or three inches thick and of sufficient width to receive the flange of the wheel case, spike them down all around the hole, and plane the face of them PERFECTLY LEVEL. This will insure the wheel setting level, and also a tight joint, as the flange of the wheel case is turned true, and at right angles with the shaft. In adjusting Wheels and machinery, great care should always be taken to have all the shaftings and bearings in perfect line; and this is especially necessary with small Wheels, for a little unnecessary friction in the different bearings causes a heavy loss of power.

Another HIGHLY IMPORTANT MATTER is to provide a RACK across the flume, to prevent the passing of driftwood and other rubbish into the Wheel. We recommend the use of iron bars; but if wood is used, make the bars one inch thick and three inches wide, and bevel to an edge on the up-stream side. The bars should be set one inch apart and less for small Wheels, and at an angle of not less than forty-five (45) degrees, so as not to diminish the area of water-way. The rack should be kept clear by frequently raking out the trash

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which accumulates against it. Attention to this matter removes almost entirely any danger of breaking or clogging the Wheel by rubbish passing into it.

We are prepared to furnish Iron Racks, and also Irons for Head Gates, and we will quote prices on application.

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CONSTRUCTION OF HEAD RACES, FLUMES, AND TAIL RACES.

IN IMPROVING a water power, no part of the same requires more careful consideration than the construction of water courses leading to and from the Wheels, yet this matter is frequently so poorly engineered as to cause a heavy loss of valuable power.

After having first determined how many horse-powers are required, or can be obtained, and how many cubic feet of water per minute are necessary to produce the required power, the next thing is to determine the requisite size of the water courses.

The forebay leading to the flume should be of sufficient width and depth to allow the water to pass to the Wheel at a velocity NEVER EXCEEDING ONE AND-A-HALF FEET PER SECOND, and should be free from abrupt turns or cramped passages, which break the water into "eddies," thereby diminishing its force and reducing the working head. The tail race should be of the same capacity, and, when practical, of sufficient depth below the surface of the stream into which it empties to have at least two feet of dead water standing the entire length of the tail race when the wheels are not in motion; and when a large amount of water is to be used on the Wheels, this depth of dead water should be increased to three or four feet. If this is done, the water, as it discharges from the Wheel, displaces the dead water and at once conforms to the general level of the water in the tail race and river, or receiving canal, and no head is lost. It is not uncommon to see two or three feet of working head lost by not complying with these conditions.

To ascertain the requisite size of flumes and tail races, use the following simple rule: Our carefully prepared tables of power, etc., will indicate the proper size of Wheel to produce the required power, and also the number of cubic feet of water the Wheel will discharge per minute. Divide the number of cubic feet stated in the table by 85, and the quotient will be the area in square feet required

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in the cross section of the head or tail race for every Wheel used. That is to say, for every 85 cubic feet of water used by the Wheel or wheels per minute, there should be one square foot in cross section of all the water passages leading to and from the Wheel, INCLUDING, OF COURSE, THE OPENING UNDNR THE FLUME, THROUGH WHICH THE WATER PASSES AFTER LEAVING THE WHEEL.

Larger water courses than indicated by the above rule are not objectionable, but desirable, for the nearer a state of rest the water can be brought to before entering and after leaving the Wheel, the better will be the results obtained. In improving a water power, properly-constructed water courses will amply repay the labor and money expended upon them, and ARE ESSENTIAL TO THE PROPER WORKING OF ANY WHEEL.

SETTING WHEELS ABOVE TAIL WATER.

SOMETIMES in adapting Wheels to very high heads, or to otherwise conform to the peculiar location, it becomes necessary to set the Wheel some distance above tail-water and to conduct the water away from the Wheel through a draft tube. The same depth of pit and area of discharge are required where a draft tube is used as would be were the Wheel set at the bottom of the fall, and the mouth of the draft tube must always be submerged from two to four inches in STANDING TAIL-WATER WHEN AT ITS LOWEST STAGE.

THEORETICALLY, draft tubes may be used of any length up to thirty feet, but PRACTICALLY, we find it unadvisable to use draft tubes exceeding twenty feet in length, because of the difficulty in making and KEEPING them PERFECTLY AIR-TIGHT; and if the draft tube LEAKS AIR AT ALL the vacuum is imperfect, the Wheel step will burn out for want of lubrication, and loss of power, due to the loss of head, is the result. Draft tubes, if used, should be as short as possible, and must be of sufficent INTERNAL DIAMETER to receive the cylinder of the wheel case, as given in Table of Dimensions.

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MEASUREMENT OF WATER POWERS.

BEFORE improving a water power, it is necessary to ascertain exactly how much fall can be secured and how much water can be relied upon, as upon these facts depends the value of the proposed improvement. The improvement of a water power is attended with considerable expense, and to prevent disappointment in discovering, after the proposed mill or factory is completed, that the stream does not afford sufficient power to carry the machinery, we advise parties not to rely upon a mere superficial examination of the stream which it is proposed to improve, but to employ some person who is well versed in hydraulics to carefully measure the capacity of the stream. As this cannot always be done, we will give a few simple directions which will enable anybody to determine approximately the amount of water in a stream.

Where the stream is not too wide to admit of it, the simplest mode of measurement is by means of a weir, as shown in engraving on following page. Take a board of sufficient length and width to produce a dam across the stream; cut a notch in the top of the board of sufficient depth to pass all the water to be measured, the length of this notch not exceeding two-thirds of the width of the stream. The bottom and both ends of this rectangular notch, which is termed a weir, should be beveled on the down-stream side to within one-eighth of an inch of the up-stream side of the board, leaving the edge or crest of the weir almost sharp and perfectly level. A stake should be driven in the bottom of the stream a few feet back of the weir, the top of the stake being exactly level with the crest of the weir—this level being easily found as the water begins to spill over the weir. After this water has reached its greatest depth, make a careful measurement of its depth over the top of the stake by means of a square, and this depth will indicate the true depth of the water upon the crest of the weir. The amount of water the stream furnishes can now be computed from the Table for Weirs on the following page. Care must be taken to have the board of sufficient width to set the water back to a dead level before it passes over the weir, and that the water has a CLEAR FALL of not less than six inches below the crest of the weir.

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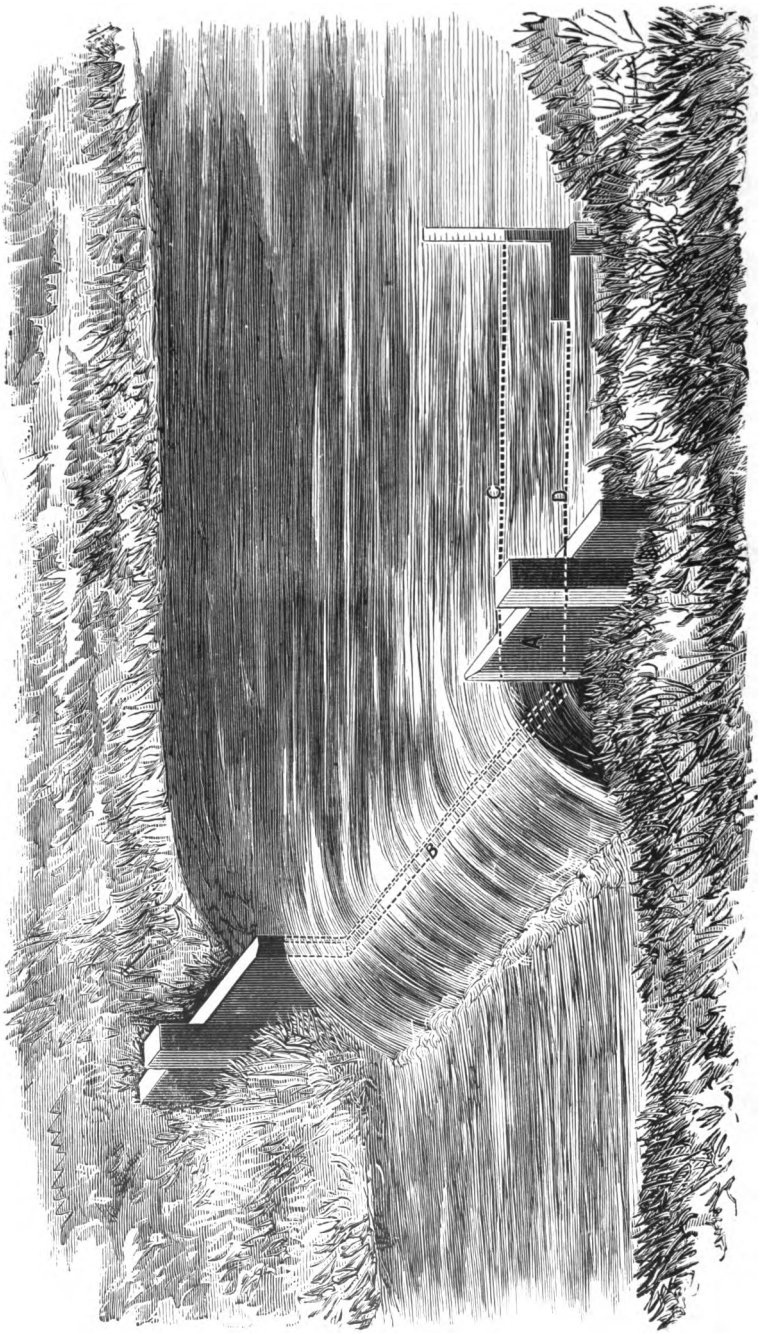

WEIR DAM.

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An important matter in connection with the measurement of small streams is the possibility of damming, and thus storing up the water and using it only part of the time instead of constantly. Thus, if the natural flow of a stream can be retained in a pond for twelve hours, for the remaining twelve hours double the quantity can be used, and consequently double the power of the stream can be obtained for that length of time. In the case of small streams, we request our correspondents to send us the weir measurements, and also state what length of time the water can be dammed or held back.

If the stream be too large to measure conveniently by means of a weir, as above described, select some place in the stream where there is a moderate current, or smooth, even flow of water, and measure the velocity by throwing in a float (sufficiently weighted to sink it well into the water) and time the passage of this float from one fixed point to another fixed point; and repeat often enough to be sure that you have the accurate time. Now measure the width of the stream, and its average depth by taking the depth in several places. Then measure accurately the amount of fall that can be obtained, and send these facts to us, and we will return an estimate of the number of horse-power the stream will produce.

We are at all times ready to make estimates and plans for improving water powers for parties desiring our services.

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TABLE FOR WEIRS.

INCHES DEPTH ON WEIR	0	1/8	1/4	3/8	1/2	5/8	3/4	7/8
1.....	0.40	0.47	0.56	0.65	0.74	0.83	0.97	1.03
2.....	1.14	1.25	1.36	1.47	1.59	1.71	1.84	1.96
3.....	2.09	2.12	2.36	2.60	2.64	2.78	2.93	3.06
4.....	3.22	3.38	3.53	3.69	3.85	4.01	4.17	4.35
5.....	4.51	4.68	4.85	5.02	5.25	5.38	5.56	5.74
6.....	5.92	6.10	6.30	6.49	6.68	6.87	7.07	7.27
7.....	7.46	7.67	7.87	8.07	8.28	8.49	8.70	8.91
8.....	9.12	9.33	9.55	9.77	9.99	10.21	10.43	10.66
9.....	10.88	11.11	11.34	11.57	11.80	12.04	12.27	12.51
10.....	12.75	13.15	13.23	13.47	13.72	13.96	14.21	14.46
11.....	14.71	14.96	15.21	15.46	15.72	15.98	16.24	16.49
12.....	16.76	17.02	17.28	17.55	17.82	18.08	18.35	18.62
13.....	18.89	19.17	19.44	19.72	20.00	20.27	20.56	20.83
14.....	21.12	21.40	21.68	21.97	22.26	22.55	22.83	23.13
15.....	23.42	23.71	24.01	24.30	24.60	24.90	25.19	25.50
16.....	25.80	26.10	26.41	26.71	27.02	27.32	27.63	27.94
17.....	28.26	28.57	28.88	29.19	29.51	29.83	30.14	30.46
18.....	30.78	31.11	31.43	31.75	32.07	32.40	32.73	33.05

THE above Table for Weirs gives the number of cubic feet per minute that will pass over a weir one inch wide, and from one inch to eighteen and seven-eighths inches deep.

In the left-hand column, marked "Inches Depth on Weir," is the depth of water flowing over the weir; and the second column, under "0," is the number of cubic feet per minute for the even inches in depth. In the third column, under "1/8" is the amount of the second column, with the additional one-eighth inch in depth added, and so on across the table from left to right.

By multiplying the number of cubic feet one inch in width will discharge, as stated in table, by the width of the weir in inches, the result will be the total discharge of the weir per minute. The depth on the weir should be measured at a point just back of where the curve on the surface of the water commences.

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VELOCITY AND DISCHARGE OF WATER THROUGH SUBMERGED ORIFICES.

Table Showing the Theoretical Spouting Velocity of Water in Feet per Second, and Number of Cubic Feet Discharged per Minute, Through an Orifice of One Inch Area, under Different Heads, from 1 to 40 Feet.

(Calculated from Francis' Formulas.)

Head in Feet	Velocity per Second in Feet	Cubic Feet per Minute, Area of Orifice, 1 Inch	Head in Feet	Velocity per Second in Feet	Cubic Feet, per Minute, Area of Orifice, 1 Inch	Head in Feet	Velocity per Second in Feet	Cubic Feet per Minute, Area of Orifice, 1 Inch	Head in Feet	Velocity per Second in Feet	Cubic Feet per Minute, Area of Orifice, 1 Inch
1	8.02	3.34	11	26.60	11.08	21	36.75	15.31	31	44.65	18.60
2	11.34	4.73	12	27.78	11.57	22	37.62	15.66	32	45.37	18.90
3	13.89	5.78	13	28.91	12.05	23	38.46	16.02	33	46.07	19.20
4	16.04	6.68	14	30.00	12.49	24	39.29	16.36	34	46.76	19.48
5	17.93	7.47	15	31.06	12.94	25	40.10	16.71	35	47.45	19.76
6	19.64	8.18	16	32.08	13.36	26	40.89	17.04	36	48.12	20.05
7	21.22	8.84	17	33.06	13.77	27	41.67	17.36	37	48.78	20.33
8	22.68	9.45	18	34.02	14.18	28	42.43	17.68	38	49.44	20.60
9	24.06	10.02	19	34.96	14.57	29	43.19	17.98	39	50.08	20.87
10	25.36	10.57	20	35.87	14.94	30	43.93	18.30	40	50.72	21.13

THE above table represents the THEORETIC velocity and discharge due to an orifice conformed in all respects to the shape of the contracted vein. IN ORDINARY PRACTICE, THROUGH ORIFICES HAVING PARALLEL SIDES, THE ACTUAL VELOCITY AND DISCHARGE WILL BE BUT ABOUT 64 PER CENT OF THE TABLE. Bearing this fact in mind, the above table may be used with reasonable accuracy in measuring the discharge of water through ordinary gate openings into Overshot and Breast Wheels, through waste gates, and other apertures cut in plank.

EXAMPLE:—Suppose the opening through which the water passes onto an Overshot Wheel to be 72 inches long, and the gate to be hoisted 2 inches, what amount of water will it discharge per minute with 3 feet head of water in the forebay above the opening?

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SOLUTION:—72 × 2 inches equals 144 square inches × 5.78 (the discharge stated in table for an orifice of one inch area under 3 feet head) equal 832 cubic feet THEORETIC discharge per minute, 64 per cent of which equals 532 cubic feet ACTUAL discharge per minute.

There are many instances in powers already improved where the quantity of water in a stream can be ascertained by using the above table, without resorting to measurement by weir.

In ascertaining the head of water under which an orifice is discharging, measure from the surface of the water to the center of the orifice.

SPECIAL NOTICE TO CORRESPONDENTS.

WE FREQUENTLY receive letters of inquiry in which all or part of the facts necessary to enable us to make a definite reply are omitted. If correspondents will always give the following data, much delay will be prevented in furnishing them the desired information:

State clearly your Postoffice, County and State.

What is the full head or vertical distance from surface of head water to the surface of tail water when at rest?

What quantity of water, in cubic feet per minute, can be relied upon?

What amount of power is required?

What kind of machinery is to be driven, and kind and amount of labor to be performed?

STATE ALL PARTICULARS; it takes less time to read long letters than it does to write for further particulars.

In ORDERING WHEELS, state clearly which way the Wheel is desired to run, right hand or left hand.

Also give full shipping directions, if any particular route is preferred.

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PROMINENT POINTS OF SUPERIORITY.

In this connection, permit us to briefly recapitulate the points of superiority found in the VICTOR TURBINE.

ITS ENORMOUS CAPACITY, being from two to three times greater than ordinary Turbines of the same diameter.

ITS UNPARALLELED EFFICIENCY, in point of economy in the use of water, steadiness of motion, and reliability in all respects.

ITS THOROUGH SIMPLICITY, being composed of the smallest number of parts, all of which are very strong and readily accessible in case of necessity.

ITS PERFECT GATE, which operates easily and quickly under any head, admits of perfect control by a governor, shuts tight, and is so simple and so thoroughly protected that it cannot get out of order.

ITS MECHANICAL CONSTRUCTION, which is conceded to be very superior in all respects. All the tested Wheels before referred to were taken from our regular stock to fill orders, and received no extra finish of any kind.

Its Enormous Capacity in a small diameter,
High Percentage of Useful Effect,
Simple, Strong Construction,
and Perfect Gate, give the

VICTOR TURBINE

a combination of excellencies
not found in any other Wheel.

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REFERENCES.

NOTWITHSTANDING the convincing character of the testimony elsewhere presented of the great superiority of the Victor Turbine, we urge upon parties who are investigating the Water Wheel question to visit places where our Wheels are in use and see for themselves. To facilitate such a personal investigation of the merits of the Victor, we append a partial list of parties using it, and who, we feel assured, will extend to visitors all reasonable facilities for observing the actual work of their Wheels. We could fill a volume with the most flattering testimonial letters from users of these Wheels, but space forbids.

ELECTRIC LIGHT AND POWER PLANTS.

Phœnix Electric Light Co., Phœnix, N. Y.—55-inch wheel, 7 feet head.

San Bernardino Electric Light and Power Co., San Bernardino, Cal.—Pair of 20-inch wheels on horizontal shaft, 40 feet head.

Spokane Electric Light and Power Co., Spokane Falls, Wash.—30-inch wheel.

Edison Sault Light and Power Co., Sault Ste. Marie, Mich.—Two 44-inch and one 55-inch wheels 7 feet head.

The Appleton Edison Light Co., Appleton, Wis.—44-inch wheel.

Hoosick Falls Light and Power Co., Hoosick Falls, N. Y.—Two pairs of 30-inch wheels on horizontal shafts, with flumes, etc., complete power plant.

Pendleton Electric Light Co., Pendleton, Ore.—20-inch wheel in iron flume.

Excelsior Electric Co., Harrisburg, Pa.—Two pairs of 35-inch wheels on horizontal shafts, with center draft box.

Edison Allegan Light and Power Co., Allegan, Mich.—Two 35-inch wheels.

Willamette Falls Electric Light Co., Oregon City, Ore.—Five 35-inch and one 17½-inch wheels, 30 feet head.

M. C. Moore, Walla Walla, Wash.—10-inch wheel.

Elkhart Electric Co., Elkhart, Ind.—55-inch wheel.

Edison Incandescent Electric Co., Little Falls, N. Y.—40-inch wheel.

Ross Park Electric Railway Co., Spokane Falls, Wash.—Pair 17½-inch wheels on horizontal shaft, with flume, etc., complete power plant.

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Niagara Falls Hydraulic and Manufacturing Co., Niagara Falls, N. Y.—20-inch wheel, 80 feet head.

Dayton Electric Light Co., Dayton, Ohio—Four 48-inch wheels.

Electric Light Co., Beatrice, Neb.—44-inch wheel.

Aspen Electric Co., Aspen, Col.—Pair 12-inch wheels on horizontal shaft.

Marinette Electric Light Co., Marinette, Wis.—55-inch wheel.

Cowles Electric Smelting and Aluminum Co., Lockport, N. Y.—One pair 30, one pair 25, and one 12-inch wheels on horizontal shafts.

Arkansas City Gas and Electric Light Co., Arkansas City, Kan.—Two 30-inch wheels.

Eugene City Electric Light Co., Eugene City, Ore.—30-inch wheel.

Kearney Electric Light Co., Kearney, Neb.—Pair 17½-inch wheels on horizontal shaft.

Watertown Electric Light Co., Watertown, N. Y.—One pair 30-inch and one pair 27½-inch horizontal wheels, with power connections.

Edison Electric Ill. Co., Spokane Falls, Wash.—Three pairs 15-inch, one pair 17½-inch, and six pairs 10-inch horizontal wheels, with governors, flumes, etc., complete plant.

Bennington Electric Light Co., Bennington, Vt.—One 15-inch horizontal wheel.

Augusta Railway Co., Augusta, Ga.—One pair 32½-inch and one 20-inch horizontal wheels, with power connections, driving electric railway.

Rapid City Electric Co., Rapid City, S. D.—Pair 20-inch horizontal wheels, flume, governor, etc.

Brandon Electric Light Co., Brandon, Vt.—25-inch horizontal wheel.

West Asheville Improvement Co., Asheville, N. C.—35-inch and 30-inch wheels, with iron flume and power connections. Second order: Two pair 30-inch horizontal wheels.

Olympia Light and Power Co., Olympia, Wash.—Two pairs 25-inch and one 17½-inch horizontal wheels, with power connections, complete plant.

The Traylor Electric Co., Richmond, Va.—Pair 20-inch horizontal wheels, with flume, etc.

Boston and Great Falls Electric Light and Power Co., Great Falls, Mont.—One pair 20-inch and two pairs 22½-inch horizontal wheels, with all flumes, penstocks and power connections, complete, 40 feet head.

J. B. Wise, Watertown, N. Y., Electric Plant—39-inch "Cylinder Gate" wheel, with gears, etc.

The Thompson-Houston International Electric Co., Boston, Mass.—Three pairs 20-inch horizontal wheels, with flumes, penstocks and governors, for electric plant in Brazil.

Columbia Electric Light and Street Railway Co., Columbia, S. C.—Pair 42-inch "Cylinder Gate" horizontal wheels, with flume, governor and power connections.

Watertown Electric Light Co., Watertown, N. Y.—Pair 30-inch horizontal wheels.

Willamette Falls Electric Co., Oregon City, Ore.—First order: 35-inch wheel, with gears, etc. Second order: one 45-inch and one 30-inch "Cylinder Gate" horizontal wheels, with flumes, penstocks, etc.

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Rumford Falls Light and Water Co., Rumford Falls, Me.—21-inch "Cylinder Gate" horizontal wheel, with flume, governor and power connections.

General Electric Co., Atlanta, Ga.—Two pairs 30-inch horizontal wheels, with flumes, etc., for electric plant at Asheville, N. C.

Portland General Electric Co., Portland, Ore.—Ten 60-inch, ten 42-inch, and two special 48-inch "Cylinder Gate" wheels, with flumes, penstocks, power connections, etc. Complete plant of special design to meet the peculiar and difcult requirements of the situation.

Worcester Electric Light and Power Co., Worcester, England—Three 48-inch and one 30-inch "Cylinder Gate" wheels and power connections, complete plant.

Athens Electric Railway Co., Athens Ga.—First order: one pair and one single 33-inch. Second order: one single 39-inch Horizontal Victor Wheel.

Laconia Electric Light Co., Laconia, N. H.

Morrisville Electric Light Co., Morrisville, N. Y.

Lachine Rapids Hydraulic and Land Co., Montreal, Quebec.

Plattsburg Light, Heat and Power Co., Plattsburg, N. Y.

Ogdensburg Street Railway Co., Ogdensburg, N. Y.

Franklin Light and Power Co., Franklin Fall, N. H.

Chambly Manufacturing Co., Montreal, Quebec.

Village of Wells River, Wells River, Vt.

Montmorency Electric Power Co., Quebec.

St. Anthony Falls Water Power Co., Minneapolis, Minn.

St. Catherines Electric Light and Power Co., Ltd., St. Catherines, Ont., Canada, 48-inch "Register Gate" wheel.

The Brunswick Electric Light and Power Co., Brunswick, Me.—45-inch "Cylinder Gate" wheel and power connections.

The Woodstock Electric Co., Woodstock, Vt.—36-inch horizontal "Cylinder Gate" wheel with power connections complete.

Woonsocket Electric Machine and Power Co., Woonsocket, R. I.—Two pairs 36-inch horizontal "Cylinder Gate" wheels, with flumes, complete.

San Bernardino Electric Light Co., San Bernardino, Cal.—25-inch horizontal wheel, with flume, complete.

Stoughton Electric Light and Power Co., Stoughton, Wis.—36-inch "Cylinder Gate" Victor wheel.

R. M. & W. F. Johnson, Salisbury, Md.—Two 35-inch and one 32½-inch Victor wheels for electric plant.

Laconia Electric Light Co., Laconia, N. H.—One 42-inch and two 33-inch "Cylinder Gate" wheels and power connections.

Worcester Electric Light Plant, Worcester, England.—Two 54-inch, one 48-inch, and one 30-inch "Cylinder Gate" wheels.

St. Johnsbury Electric Co., St. Johnsbury, Vt.—54-inch "Cylinder Gate" wheel.

Municipal Electric Plant, Morrisville, Vt.—Pair 33-inch horizontal "Cylinder Gate" wheels, with power connections, complete.

Compania Mineira de Electrici dade Juize Flora (Minas), Brazil.—Special 36-inch

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horizontal "Cylinder Gate" wheel, with feeder and connections, complete plant.

Dolgeville Electric Light and Power Co., Dolgeville, N. Y.—Two special 36-inch and one special 8-inch horizontal Victor wheel.

Eatonton Electric Co., Eatonton, Ga.—One 36-inch upright "Cylinder Gate" Victor turbine.

West Kootenay Electric Light and Power Co., Rossland, B. C.—First order: Two pairs of 39-inch horizontal "Cylinder Gate" Victor turbines. Second order: one pair of 45-inch improved "Cylinder Gate Victor turbines, 40 feet head.

Hartford Electric Light and Power Co., Hartford, Conn.—Two pairs of 42-inch and one pair 15-inch horizontal Victor turbines, 28 feet head.

Dayton Electric Light and Power Co., Dayton, Wash.—One 30-inch upright Register Gate Victor turbine.

Hudson River Power Transmission Co., Mechanicville, N. Y.—Ten pairs of 42-inch horizontal Victor turbines, 16 feet head.

Middlebury Electric Co., Middlebury, Vt.—One 24-inch horizontal "Cylinder Gate" Victor turbine.

Barnes Electric Light and Power Co., Maquoketa, Ia.—Two 48-inch upright "Cylinder Gate" Victor turbines.

Lancaster & Jefferson Electric Light Co., Lancaster, N. H.—One pair 24-inch horizontal "Cylinder Gate" Victor turbines.

West India Electric Co., Kingston, Jamaica, W. I.—Two pairs 21-inch and two 10-inch horizontal wheels, complete plant, 56 feet head.

Bridgeton & Harrison Electric Co., Bridgeton, Me.—one pair of 18-inch horizontal Victor turbines.

The Ottawa Electric Railway Co., Ottawa, Ont., Canada.—Three pair of 48-inch Victor turbines, 21 feet head.

The Ottawa Electric Co., Ottawa, Ont. Canada—Nine (9) 39-inch horizontal "Cylinder Gate" Victor turbines, and two pairs of 15-inch "Cylinder Gate" Victor turbines, 25 feet head.

The Falls Electric Co., Covington, Ohio.—One pair of 21-inch "Cylinder Gate" Victor turbines, 26 feet head.

The United Gas and Electric Co., Dover, N. H.—One pair of 36-inch improved "Cylinder Gate" Victor turbines.

Quebec Railway, Light and Power Co., Quebec, P. Q., Canada.—Three Victor high pressure, 45-inch wheels, each 1050 H. P., under 198 feet head.

St. Lawrence Power Co., Massena, N. Y.—Twenty-one pairs 54-inch and three pairs 21-inch horizontal Victor wheels, complete plant, 32 feet head.

St. Croix Power Co., Somerset, Wis.—Four pairs of special 36-inch, and two 12-inch single horizontal Victor wheels, complete plant, 82 feet head.

The Chambly Manufacturing Co., Montreal, P. Q., Canada.—Eight pairs 48-inch horizontal Victor wheels, 28 feet head.

Lachine Rapids Hydraulic and Land Co., Montreal, P. Q., Canada.—Fortyeight-inch Victor wheels, with yokes, gears, etc.; complete plant, 11 feet head.

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Cumberland Illuminating Co., Portland, Me.—Two pair of 33-inch improved "Cylinder Gate" Victor turbines on horizontal shaft. Second order: one pair 33-inch wheels, same style as first order. 36-feet head.

Waterville & Fairfield Railway and Light Co., Waterville, Me.—Two 54-inch "Cylinder Gate" Victor turbines.

McConnellsville-Malta Electric Co., McConnellsville, Ohio.—Two 45-inch vertical "Cylinder Gate" Victor turbines, with gears, etc., complete plant.

Somerset & Kennebec Co., Fairfield, Me.—Eleven 45-inch and one 36-inch vertical "Cylinder Gate" Victor turbines, with gears, etc., complete plant.

McCloud River Electric Power Co., San Francisco, Cal.—Four pairs of 30-inch Victor wheels.

Watauga Lighting & Power Co., Johnson City, Tenn.—Two 45-inch vertical Victor wheels, gears, etc.

Hamilton Electric Light and Cataract Power Co., Hamilton, Ontario.—Two Victor high-pressure wheels, 40-inch, 1500 H. P., each under 260 feet head.

TEXTILE FABRIC MILLS.

Lacowsic Woolen Co., Hampden, Mass.—20-inch wheel, 10 feet head, displaced 36-inch Clark & Chapman wheel.

Isaac Ross, Thompson, Conn.—Twine factory. 35-inch wheel, 12 feet head, displaced 36-inch Waldo Whitney wheel.

L. J. Warner, Northampton, Mass.—Silk Mill. 26-inch wheel, 21 feet head, displaced Leffel.

Merrick & Conant Mfg. Co., East Hampton, Conn.—Silk mill. 15-inch wheel, 20 feet head.

New High Shoals Mfg. Co., High Shoals, Ga.—Cotton factory. 48 and 35-inch wheels, 9 feet head, drive entire factory.

George H. Mansfield & Co., Canton, Mass.—Thread mill. 25-inch wheel.

Houghton & Allton, Putnam, Conn.—Cotton factory. 17½-inch wheel, 26 feet head, displaced Leffel wheel.

Greenville Mfg. Co., Florence, Mass.—Cotton factory. Two 17½-inch wheels in iron flumes, 27 feet head, displaced two 30½-inch Leffel wheels.

Ravine Mills Co., Vernon Depot, Conn.—Cotton factory. 17½-inch wheel, 20 feet head, displaced National wheel.

Napoleon Woolen Mills, Napoleon, Ohio.—17½-inch wheel, 18 feet head, displaced overshot wheel, and drives entire mill.

Beaver Dam Cotton Mills, Beaver Dam, Wis.—Three 44-inch wheels, drive entire factory.

Hanover Mfg. Co., Hanover, Ill.—Woolen factory. 35-inch wheel, 15 feet head.

Pelham Mills, Greenville, S. C.—Cotton factory. 30-inch wheel, 18 feet head.

Mt. Verd Mills Co., Athens, Tenn.—Cotton factory. 15 and 12-inch wheels.

Avon Mfg. Co., Lewiston, Me.—Cotton mill. 15-inch wheel in iron flume, under 50 feet head.

Merritton Cotton Mills Co., Merritton, Can.—Two 44 and one 35-inch wheels, 12 feet head.

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Knox Woolen Co., Camden, Me.—35-inch wheel, 10 feet head.

Central Falls Mfg. Co., Central Falls, N. C.—Cotton factory. 30-inch wheel.

R. Kenney & Sons, Somersville, Conn.—Woolen mill. 30-inch wheel, 13 feet head.

Ponaganset Co., Rockland, R. I.—Cotton mill. 35-inch wheel, 22 feet head.

Matoaca Co., Petersburg, Va.—Cotton factory. 44-inch wheel, 17 feet head.

Berg & Bro., San Antonio, Tex.—Woolen factory. 35-inch wheel.

National Thread Co., Mansfield Centre, Conn.—20-inch wheel.

Bennington Woolen Mills, Bennington, Vt.—30-inch wheel, 28 feet head.

L. L. Allen & Co., Mumford, N. Y.—Woolen factory. 25-inch wheel.

J. Turner & Sons Mfg. Co., Kent, Ohio.—Alpaca mills. 20-inch wheel, 20 feet head.

Crabtree & Patchett, Montgomery, N. Y.—Woolen factory. 48-inch wheel.

Haskell Silk Co., Saccarappa, Me.—30 and 12-inch wheels, 15 feet head.

James Riddle, Son & Co., Wilmington, Del.—Cotton factory. 40-inch wheel, 14 feet head.

Riverside Cotton Mills, Danville, Va.—20-inch wheel.

Wm. H. Cady, West Gloucester, R. I.—25-inch wheel, 12 feet head.

Peter Graff, Worthington, Pa.—Woolen mill. 20-inch wheel.

J. W. Busiel & Co., Laconia, N. H.—Manufacturers of yarn and hosiery. 30-inch wheel.

St. Mary's Woolen Mill, St. Mary's, Ohio.—20-inch wheel.

H. E. Bradford & Co., Bennington, Vt.—Manufacturers of knit goods. 35-inch wheel, 10 feet head, displaced 40-inch National.

Washington Mills Co., Lawrence, Mass.—Two 40-inch horizontal wheels, and one 15-inch horizontal wheel, 26 feet head, displaced Boyden wheel.

I. W. Springfield, South Wolfboro, N. H.—Manufacturers of blankets. 15-inch wheel, 25 feet head.

Hockanum Co., Rockville, Conn.—Woolen mill. 30-inch wheel on horizontal shaft, 18 feet head.

J. McLaghlin's Sons, Skaneateles Falls, N. Y.—Woolen mill. 40-inch wheel.

P. J. & J. G. Ray, Woonsocket, R. I.—Woolen mill. One pair 35-inch wheels on horizontal shaft, displaced very large overshot wheel.

Hooper Mfg. Co., Mountain Island, N. C.—Cotton goods. 55-inch wheel.

Pendleton Mfg. Co., Autun, S. C.—Cotton goods. 25 and 12-inch wheels, 17 feet head.

Cananicut Mills, Fall River, Mass.—8-inch wheel on horizontal shaft.

W. F. & S. Cordingly, Newton Lower Falls, Mass.—17½-inch wheel, 16 feet head.

Methuen Co., Methuen, Mass.—Cotton goods. One pair 25-inch wheels, and one 20-inch on horizontal shafts, 38 feet head, displaced overshots.

Morotock Mills, Danville, Va.—55-inch wheel, displaced 54-inch Hercules.

Patterson & Fry, Bluff City, Tenn.—Cotton mill. Two 35 and one 25-inch wheels.

Alfred Dolge, Dolgeville, N. Y.—Felt mill. Pair 35-inch wheels on horizontal shaft, 22 feet head.

Pacolet Mfg. Co., Pacolet, S. C.—Cotton mill. Pair of 40-inch wheels on horizontal shaft, complete with iron flume, etc. After six years' use they ordered

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for their new mill two pairs 42-inch "Cylinder Gate" and one 25-inch horizontal wheel, with all power connections complete for entire plant; followed by THIRD order for new No. 3 mill for one pair 48-inch and one single 21-inch horizontal "Cylinder Gate" wheels.

Clifton Mfg. Co., Clifton, S. C.—Cotton mills. Two pairs of 48 and one single 30-inch wheel on horizontal shafts, complete with iron flumes, etc. (See engraving.)

South Bend Woolen Co., South Bend, Ind.—44-inch wheel, displaced American.

Hanover Mfg. Co., Hanover, Ill.—Woolen mills. 17½-inch wheel.

Henrietta Mills, Henrietta, N. C.—Cotton mills. Pair 35-inch wheels, horizontal shaft, complete with iron flume, etc. (See engraving.)

Old Town Woolen Co., Old Town, Me.—Pair 35-inch wheels on horizontal shaft, complete with iron flume, feeder, etc.; complete power plant.

Enoree Mfg. Co., Enoree, S. C.—Cotton mill. Pair of 35-inch wheels on horizontal shaft, with iron flume, feeder, etc.; complete power plant.

Canada Hair Cloth Co., St. Catherines, Ont., Can.—17½-inch wheel.

Piedmont Mfg. Co., Piedmont, S. C.—Cotton mills. Three 48-inch wheels in iron flumes, with all driving gears, pulleys, etc. (See engraving.)

Camden Woolen Co., Camden, Me.—35-inch wheel.

Theo. Tietz, East Hampton, Conn.—20 and 17½-inch wheels.

W. A. Sparger, Bristol, Tenn.—20-inch wheel.

Morotock Mills, Danville, Va.—Two 44-inch wheels.

Exeter Mfg. Co., Exeter, N. H.—48-inch wheel.

Robbins Bros., Beverly, Ohio.—Woolen mills. 25-inch wheel.

The Portsmouth Co., South Berwick, Me.—35-inch wheel on horizontal shaft, with flume, etc.; complete power plant. Second order: One 48-inch horizontal wheel, with power connections complete.

The Whitney Mfg Co., Spartansburg, S. C.—Cotton mill. 35-inch wheel on horizontal shaft, with flume, etc.; complete power plant.

The Cocheco Mfg. Co., Dover, N. H.—12-inch wheel on horizontal shaft, with flume, etc.

H. E. Bradford & Co., Bennington, Vt.—15-inch wheel.

The Annis Cotton Mills, McMinnville Tenn.—25-inch wheel.

Camperdown Mfg. Co., Greenville, S. C.—One 30-inch and two 20-inch wheels, with flumes, etc., complete.

The Pelzer Mfg. Co., Pelzer, S. C.—55-inch wheel in iron flume, with gears, etc., power plant complete; followed by second order of five gears 39-inch horizontal "Cylinder Gate" wheels, with power connections complete, for their new mill.

The Georgia Mfg. Co,, Athens, Ga.—48-inch wheel, 21 feet head.

The Pelham Mfg. Co., Pelham, S. C.—35-inch wheel, with flume, etc., complete power plant, also 25-inch horizontal wheel.

Tremont & Suffolk Mills, Lowell, Mass.—Six 48-inch wheels, with iron flumes, etc., complete power plant.

A. Linn, Hartland, Me.—48-inch wheel.

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L. Beebe & Co., Taunton, Mass.—44-inch wheel.

The Zoar Society, Zoar, Ohio.—30-inch wheel.

Aldrich & Milner, Moosup, Conn.—Pair 30-inch horizontal wheels, governor, etc.

Whittenton Mfg. Co., Taunton, Mass.—40-inch wheel, governor, power connections, etc.

The Taylor Mfg. Co., Reynolds, Ga.—Pair 20-inch horizontal, with power connections, etc.

Stroudsburg Woolen Mills, Stroudsburg, Pa.—20-inch wheel and power connections.

Pacolet Mfg. Co., Pacolet, S. C.—Cotton mill. 40-inch horizontal and power connections for rope transmission.

H. T. Carpenter & Sons, Maiden, N. C.—Cotton mill. 15-inch horizontal, with rope drive power connections.

J. Turner Moorehead & Co., Leaksville, N. C.—32½-inch horizontal wheel, with governor, etc.

Tallassee Falls Mfg. Co., Tallassee, Ala.—One pair 48-inch, and one 35-inch horizontal, with governors and power connections.

Porterdale Mills, Covington, Ga.—35-inch horizontal wheel, with governor, etc.

Avon Mfg. Co., Lewiston, Me.—20-inch horizontal, 50 feet head.

Glenside Woolen Mills, Skaneateles Falls, N. Y.—32½, 20, and 17½-inch horizontal wheels. (See engraving.)

Tingue House & Co., Glenville, Conn.—25-inch wheel.

Jesse V. Palmer, Greenwich, N. Y.—Knitting mill. 20-inch wheel.

Kearney Cotton Mills Co., Kearney, Neb.—Pair 35-inch horizontal wheels, flumes, etc.

The D. E. Converse Co., Glendale, S. C.—Cotton mill. 39-inch "Cylinder Gate Victor" on horizontal shaft, with all power connections complete.

The Blackstone Mfg. Co., Blackstone, Mass.—Cotton mill. 20-inch horizontal wheel, with governor and power connections.

Holroyd & Co., Waterford, N. Y.—Knitting mill. 25-inch wheel with iron flume, etc.

Joseph Bancrofts & Sons Co., Wilmington, Del.—Cotton mill. One pair 30-inch horizontal wheels, with flume, governor, etc.

The Hamilton Woolen Co., Southbridge, Mass.—First order: One pair 35-inch "Register Gate," and one single 36-inch "Cylinder Gate" horizontal wheels, with flumes, penstocks, etc., complete. Second order: One pair 36-inch "Cylinder Gate" horizontal wheels, with power connections complete.

The Cabot Mfg. Co. Brunswick, Me.—One pair 48-inch horizontal wheels, with flume, penstock, etc., complete; followed by second order for 39-inch wheel.

The Granite Cotton Mills, Haw River, N. C.—60-inch wheel with gears and power connections.

Megunticook Woolen Co., Camden, Me.—35-inch wheel.

Nemasket Mills, Taunton, Mass.—Cotton mills. Six pairs 36-inch "Cylinder Gate" horizontal wheels, with flumes, penstocks and power connections, complete plant.

Westbrook Mfg. Co., Westbrook, Me.—Cotton mills. Two 55-inch wheels.

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Cooper Mfg. Co., Bennington, Vt.—Knitting mill. 17½-inch horizontal wheel. with flume, penstock and power connections.

Mount Baltic Woolen Co., Camden, Me.—33-inch "Cylinder Gate" horizontal wheel, with power connections, fire pump, etc., complete.

Vassalboro Woolen Co., North Vassalboro, Me.—33-inch and 18-inch "Cylinder Gate" horizontal turbines, both in one flume, with governor, etc.

Worumbo Mfg. Co., Lisbon Falls, Me.—Pair 42-inch "Cylinder Gate" horizontal wheels, with flume, penstock and power connections.

Trion Mfg. Co., Trion, Ga.—Cotton mill. Pair 12-inch horizontal wheels, with governor, power connections, etc.

The Plymouth Cordage Co., North Plymouth, Mass.—15-inch "Cylinder Gate" horizontal wheel, with flume, penstock, etc.

Bates Mfg. Co., Lewiston, Me.—39-inch "Cylinder Gate" horizontal wheel, with governor, fire pump, etc.; followed by SECOND order for 48-inch "Cylinder Gate" wheel.

Pendleton Mfg. Co., Autun, S. C.—27½-inch wheel.

Georgia Mfg. Co., White Hall, Ga.—Cotton mill. Pair 32½-inch horizontal wheels, with flume, penstock, etc., complete.

Pee Dee Mfg. Co., Rockingham, N. C.—Cotton mill. 42-inch "Cylinder Gate" wheel, with iron flume and power connections, displaced Hercules wheel.

Sanford Mills Co., Sanford, Me.—One pair 33-inch, and single 21-inch "Cylinder Gate" wheels, with power connections.

Canadian Colored Cotton Mills Co. (Limited), Montreal, Can.—Three 54-inch "Cylinder Gate" wheels, with iron flumes, rope, pulleys, and power connections complete, for their cotton mill at Cornwall, Can.

Trion Mfg. Co., Trion, Ga.—Pair 40-inch horizontal wheels.

McAden Mills, McAdensville, N. C.—Pair 42-inch "Cylinder Gate" horizontal wheels, complete.

Columbia Cotton Mills Co., Columbia, S. C.—Two pairs 48-inch, and one 24-inch horizontal "Cylinder Gate" wheels, complete power plant.

Athens Mfg. Co., Athens, Ga.—48-inch wheel.

Bowen, Jewell & Co., Jewell, Ga.—42-inch "Cylinder Gate" wheel with power connections.

Camden Cotton Mills Co., Camden, S. C.—One pair 36-inch "Cylinder Gate" horizontal wheels.

Courtney Mfg. Co., Seneca, S. C.—One pair 42-inch, and one single 21-inch horizontal "Cylinder Gate" wheels with power connections complete.

Dominion Cotton Mills Co., Brantford, Ont., Can.—Two 48-inch "Cylinder Gate" wheels with power connections.

White, Williams & Co., Graham, N. C.—45-inch "Cylinder Gate" wheel with power connections.

Lockhart Mills, Lockhart Shoals, S. C.—Two pairs 36-inch "Cylinder Gate," and one single 22½-inch "Register Gate" horizontal wheels, complete power plant.

Prattville Cotton Mills and Banking Co., Prattville, Ala.—One pair 35-inch "Register Gate" horizontal wheels.

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West Point Mfg. Co., West Point, Ga.—60-inch "Cylinder Gate" wheel with power connections.

A. M. Armstrong & Co., Guild, N. H.—36-inch horizontal "Cylinder Gate" wheel and power connections.

Tucapau Mills, Gaffney, S. C.—45-inch and 21-inch horizontal "Cylinder Gate" wheels with power connections complete.

Midway Mills, Rockingham, N. C.—42-inch "Cylinder Gate" wheel.

Glencoe Cotton Mills, Burlington, N. C.—48-inch "Cylinder Gate" wheel and connections.

Bellmont Cotton Mills, Burlington, N. C.—Two 33-inch "Cylinder Gate" wheels with power connections.

W. E. & J. H. Holt, Burlington, N. C.—18-inch "Cylinder Gate" wheel and power connections.

Holden & Leonard Co., Bennington, Vt.—33-inch horizontal "Cylinder Gate" wheel and power connections.

Linn Woolen Co., Hartland, Mo.

Franklin Falls Co., Franklin Falls, N. H.

Covington Woolen Mills, Covington, O.

Randolph Mfg. Co., Franklinville, N. C.

Cedar Falls Mfg. Co., Cedar Falls, N. C.

St. Mary's Woolen Mfg. Co., St. Mary's, Ohio.

Wauregan Mills, Wauregan, Conn.

Rippowan Woolen Mfg. Co., Greenwich, Conn.

J. R. & E. K. Ray, Woonsocket, R. I.

Norris Cotton Mills Co., Central, S. C.

Putnam Mfg. Co., Putnam, Conn.

Cleveland Cotton Mills, Lawndale, N. C.

Canadian Colored Cotton Mills Co., Cornwall, Ontario.

Cleveland Cotton Mills, Shelby, N. C.

Worth Mfg. Co., Worthville, N. C.

Norwalk Mills Co., Winnipauk, Conn.

Guerin Spinning Co., Woonsocket, R. I.

Great Falls Mfg. Co., Rockingham, N. C.

Leicester Knitting Mills, Woonsocket, R. I.

The Cooleemee Cotton Mills, Greenboro, N. C.—One single 36-inch wheel, and two pair of 39-inch horizontal Victor wheels, 22 feet head.

Pacolet Mfg. Co., Pacolet, S. C.—One 18-inch horizontal "Cylinder Gate" Victor Turbine.

Cabot Mfg. Co., Brunswick, Me.—Three 45-inch "Cylinder Gate" Victor wheels.

Eagle & Phœnix Mills, Columbus, Ga.—One 42-inch upright "Cylinder Gate" Victor wheel.

The Columbia Mills, Lewiston, Me.—One pair of 33-inch "Cylinder Gate" Victor wheels.

Tingue Mfg. Co., Seymour, Conn.—One 33-inch "Cylinder Gate" Victor wheel.

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Hope Mills Mfg. Co., Philadelphia, Pa.—One 36-inch improved upright "Cylinder Gate" wheel.

Leaksville Cotton Mills, Spray, N. C.—One 21-inch improved upright "Cylinder Gate" wheel.

White, Williamson & Co., Graham, N. C.—One 18-inch "Cylinder Gate" wheel.

Canadian Colored Cotton Mills Co., Montreal, P. Q.—Three 54-inch and one 24-inch "Cylinder Gate" Victor wheels.

Chatham Mfg. Co., Elkin, N. C.—One 21-inch and one 18-inch vertical "Cylinder Gate" wheels.

PAPER AND PULP MILLS.

Vernon Bros. & Co., New York; mills at Salmon Falls, near Westfield, Mass.—22 feet head, 48-inch wheel, displaced "American", and drives 12 large engines and one Gordan engine; also 20 and 15-inch wheels, driving calendars and Fourdrinier machine.

Ohio Paper Co., Miamisburg, Ohio.—18 feet head, two 35-inch wheels.

The Delaney & Munson Mfg. Co., Unionville, Conn.—16 feet head, 35-inch wheel, displaced 48-inch Leffel wheel.

Pultz & Walkley Co., Westfield, Mass.—9 feet head, two 20-inch and 30-inch wheels, displaced Leffel wheels.

Lockport Paper Co., Lockport, Ill.—Straw Board. 48-inch and two 15-inch wheels, 18 feet head.

John Robertson, Putney, Vt.—8-inch wheel in iron flume, 32 feet head.

Frederick Burghart, West Stockbridge, Mass.—Wood pulp mill, 25-inch wheel.

Ypsilanti Paper Co., Ypsilanti, Mich.—Six 48-inch, two 55-inch, and one 30-inch wheels, 16 feet head, displaced 66-inch "New American" and Houston wheels.

Sebago Wood Board Co., Portland, Me.—Pulp mill. Thirty-two 25-inch wheels, 17 feet head.

Hart Lot Paper Co., Hart Lot, N. Y.—30-inch wheel, 21 feet head.

P. C. Baird, Lee, Mass.—12-inch wheel in iron flume, 30 feet head.

F. R. Lewis, Flint, Mich.—Straw wrapping. 44-inch wheel, 6 feet head.

Brownell & Miller, St. Charles, Ill.—30-inch wheel, 6 feet head.

Conneaut River Paper Mill, Conneaut, Ohio.—Manilla. 48-inch wheel, 9 feet head.

Dwight Paper Co., Marseilles, Ill.—48-inch wheel, 7 feet head, displaced 60-inch "American."

Platner & Porter Mfg. Co., Unionville, Conn.—Fine Paper. 20-inch wheel, 18 feet head, displaced Houston wheel.

Chas. H. Paul, Clinton, Conn.—17½-inch wheel in iron flume, 17 feet head.

Workmaster & Longknecht, Naples, Ontario Co., N. Y.—10-inch wheel, 70 feet head, wood pulp mill.

Michigan Wood Pulp Co., Niles, Mich.—30-inch wheel, 11 feet head.

Patten Paper Co., Neenah, Wis.—Three 48-inch, three 44 inch, and two 25-inch wheels, 9 feet head; six 48-inch, 6 feet head, and six 35-inch, 22 feet head.

Springdale Paper Co., Westfield, Mass.—10-inch wheel in iron flume, 68 feet head.

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Manilus Paper Co., Manilus, N. Y.—20-inch wheel.
Mt. Holly Paper Co., Mt. Holly Springs, Pa.—25-inch wheel.
Cuyahoga Paper Co., Cuyahoga Falls, Ohio.—35-inch wheel, 18 feet head, displaced Leffel wheel.
Cornwell & Bro., Ann Arbor, Mich.—44-inch and 25-inch wheels, 12 feet head.
Fox River Pulp and Paper Co., Kaukauna, Wis.—Two 48-inch and one 40-inch wheels, 16 feet head.
Androscoggin Pulp Co., Portland, Me.—25-inch wheel, 17 feet head.
Sutphin & Warren, Middletown, Ohio.—30-inch wheel, displaced 48-inch American.
Fox River Flour and Paper Co., Appleton, Wis.—55 and 35-inch wheels, 1[illegible]ee head.
E. & S. May, Lee, Mass.—15-inch wheel, 20 feet head.
Winnipisseogee Paper Co., Franklin Falls, N. H.—48-inch wheel, 14 feet head.
Umbagog Pulp Co., Portland, Me.—Eight 25-inch wheels, 17 feet head.
Richards & Co., Gardiner, Me.—17½-inch wheel, 16 feet head,
William Russell & Co., Bellows Falls, Vt.—40-inch wheel, 22 feet head.
Glen Pulp and Paper Co., Hoosac Tunnel, Mass.—Two 30-inch wheels, 29 feet head.
Union Pulp Co., Kaukauna, Wis.—44-inch wheel, 14 feet head.
Levi Dodge, Constantine, Mich.—40-inch wheel, 7 feet head.
Winnebago Paper Mills, Neenah, Wis.—48-inch wheel, 7 feet head.
John O. Wagener, Easton, Pa.—25-inch wheel.
Friend & Forgy Paper Co., Franklin, Ohio.—48-inch wheel, 13 feet head, displaced 56-inch Leffel "Special."
Harding Paper Co., Franklin, Ohio.—55-inch wheel, displaced 66-inch "American."
White Mountain Pulp and Paper Co., Berlin Falls, N. H.—35-inch wheel, 19 feet head.
Pioneer Mfg. Co., Paper, Ga.—20-inch wheel, 32 feet head.
Peninsula Paper Co., Ypsilanti, Mich.—55 and 30 inch wheels.
Keeney Bros., North Manchester, Conn.—20-inch wheel.
Kimberly & Clark Co., Neenah, Wis.—Twenty-two 55-inch, two 48-inch, one 40-inch, one 35 inch and two 30-inch wheels.
Barnitz Paper Co., Middletown, Ohio.—25-inch wheel, displaced Leffel wheel.
Elkhart Paper Co., Elkhart, Ind.—35-inch and two "Special" 48-inch and one 44-inch wheels, displaced "American."
Cornell Mfg. Co., Ann Arbor, Mich.—20-inch wheel.
Allen Bros., Sandy Hook, N. Y.—20-inch wheel.
Globe Tissue Paper Co., Elkhart, Ind.—30 and 25-inch wheels.
M. D. Keeney, Wilmington, Ill.—40-inch wheel, 7 feet head.
The Buckingham Pulp Co., Limited, Montreal, Can.—Two 35, one 25, and four 17½-inch wheels, 40 feet head.
Erwin-Lane Paper Co., Elkhart, Ind.—40 and 25-inch wheels, displaced 36-inch "American."
Graham & Cunningham, Camden, Carroll Co., Ind.—30-inch wheel.

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C. E. Bingham, Germantown, N. Y.—17½-inch wheel, displaced Leffel wheel.

Louis Snider's Son's, Hamilton, Ohio.—30-inch wheel.

J. R. Beardsley, Elkhart, Ind.—12-inch wheel, 23 feet head.

Green Mountain Pulp Co., Middlebury, Vt.—Four 35-inch wheels, 29 feet head.

Niagara Wood Paper Co., Niagara Falls, N. Y.—25-inch wheel, 80 feet head.

Charles A. Clark, Logansport, Ind.—35-inch wheel, 13 feet head.

Albemarle Paper Mfg. Co., Richmond, Va.—25-inch wheel in iron flume, 45 feet head.

Wyman, Flint & Sons, Bellows Falls, Vt.—40-inch wheel.

Bardeen Paper Co., Otsego, Mich.—Six 48, one 40, and two 35-inch wheels.

Stewart Paper Co., Conyers, Ga.—15-inch wheel.

Ohio Paper Co., Niles, Mich.—44-inch wheel, 10 feet head.

Angell & Langdon, Greenwich, N. Y.—20 and 48-inch wheels.

Miami Valley Paper Co., Miamisburg, Ohio.—35-inch wheel on horizontal shaft, 18 feet head.

Beaver Falls Paper Co., Beaver Falls, Pa.—Two 35-inch wheels.

Stewart Paper Manufacturing Co., Conyers, Ga.—30-inch wheel.

Otis Falls Pulp Co., Livermore Falls, Me.—One pair 30, two single 30, and one single 25-inch wheels on horizontal shafts, and two 35-inch wheels all complete with iron flumes, feeders, etc.

J. C. Morgan Paper Co., Battle Creek, Mich.—One 55 and two 44-inch wheels, 6 feet head.

Tytus Paper Co., Middletown, Ohio.—17½-inch wheel, displaced "American."

Albemarle Paper Mfg. Co., Richmond, Va.—25-inch wheel, in iron flume, 45 feet head.

Reese Pulp Co., Kaukauna, Wis.—35-inch wheel, displaced Leffel.

C. R. Remington & Son, Watertown, N. Y.—Pulp mill. Two pairs of 30-inch wheels on horizontal shafts with center draft box.

A. Gaylor Pulp Co., Mishawaka, Ind.—48-inch wheel, 7 feet head.

Hartford Manilla Co., Hartford, Conn.—48 and 44-inch wheels, 12 feet head.

Piscataquis Fall Pulp and Paper Co., Enfield, Me.—Eleven pairs of 30 and one pair of 35-inch wheels on horizontal shafts, with flumes, feeders, etc., complete power plant, 3,600 horse-power.

Combined Locks Paper Co., Appleton, Wis.—First order: Sixteen pairs of 25-inch wheels on horizontal shafts, and one pair of 30-inch wheels on horizontal shaft; one 30-inch and one 48-inch wheel, all with iron flumes, feeders, etc., complete power plant of about 3,000 horse-power, 20 feet head. Second order: Two pairs 30-inch horizontal, and one 33 and one 27-inch upright "Cylinder Gate" wheels with iron flumes, etc., complete.

Saranac River Pulp and Paper Co., Cadyville, N. Y.—Four 30 and one 17½-inch wheels. Second order: Two pairs 32½-inch, one single 32½-inch, and one 20-inch horizontal wheels, with power connections complete.

Gouverneur Wood Pulp Co., Gouverneur, N. Y.—One pair 30-inch wheels on horizontal shaft, 30 feet head.

The Niles Paper Mill Co., Niles, Mich.—40-inch wheel, 10 feet head.

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Mell R. Wilkinson, Banning, Ga.—40-inch wheel.

Fox River Paper Co., Appleton, Wis.—Four 55-inch wheels, 10 feet head.

Jackson Lumber Co., Lockport, N. Y.—Pair 48-inch wheels on horizontal shafts, with flumes, etc.

John T. Andrews, 2d, Penn Yan, N. Y.—One pair 22½, three single 12-inch, and one single 10-inch wheels on horizontal shafts, with flumes, etc.

Remington Paper Co., Watertown, N. Y.—30-inch wheel.

Felts Mills Paper Co., Watertown, N. Y.—One pair 30-inch wheels on horizontal shaft, and two pair 40-inch wheels on horizontal shaft, and eight 55-inch wheels, complete power plant.

C. R. Remington & Sons, Watertown, N. Y.—Two pairs 30-inch on horizontal shaft.

Wortendyke Mfg. Co., Richmond, Va.—44-inch wheel.

Globe Paper Co., Brownville, N. Y.—Three 44-inch wheels and power connections.

Crown Paper Co., Oregon City, Ore.—Two 12-inch and two 20-inch and 32½-inch wheels.

Livermore Falls Pulp Co., Livermore Falls, Me.—39-inch "Cylinder Gate" wheel.

The Wren Paper Co., Middletown, Ohio.—One 30-inch wheel.

Cascade Pulp Co., Lockport, N. Y.—One 17½-inch wheel.

S. D. Warren & Co., Gardiner, Me.—One pair 44-inch horizontal, one 12-inch horizontal, and two 20-inch horizontal, at Gardiner; and one pair 25-inch horizontal wheels at Cumberland Mills.

Bicking & Moore, Swathmore, Pa.—27½-inch wheel.

Wilkinson Paper Co., Banning, Ga.—25-inch wheel.

Herkimer Paper Co., Herkimer, N. Y.—One 25-inch horizontal, and one 27½-inch horizontal, and one pair 35-inch horizontal wheels.

Willard Russell & Co., Bellows Falls, Vt.—One 20-inch wheel.

Adams & Co., Chagrin Falls, Ohio.—One pair 25-inch, and one 12-inch horizontal wheel.

Willamette Pulp and Paper Co., Oregon City, Ore.—One 27½-inch, and one pair 30-inch horizontal wheels with complete connections.

Sebago Wood Board Co., South Windham, Me.—Seven pairs 27½-inch, and one 15, 30 and 48, and two 35-inch, all horizontal, with flumes, feeders, head gates, etc., complete plant.

Outterson Paper Co., Brownville, N. Y.—30-inch wheel.

Winnipisseogee Paper Co., Franklin, N. H.—17½-inch wheel.

Geo. H. Friend Paper Co., West Carrollton, Ohio.—30-inch and 32½-inch, displaced "American" wheels.

Susquehanna W. P. and Paper Co., Conowingo, Md.—Three 60-inch wheels, with iron flumes, gears, etc., complete.

Willamette Paper Co., Oregon City, Ore.—35-inch wheel.

Globe Paper Co., Brownville, N. Y.—Two 44-inch wheels with gears, etc.

Three Rivers Paper Co., Three Rivers, Mich.—44-inch wheel with gears and power connections.

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Hollingsworth & Whitney Co., Boston, Mass.—First order for mill at Gardiner, Me.: One 36-inch "Cylinder Gate" horizontal wheel with power connections. Second order: New mill at Winslow, Me., one pair 48-inch, fourteen pairs 27-inch, one single 39, 27 and 18-inch horizontal "Cylinder Gate" wheels, with flumes, penstocks, etc., complete plant. Third order: 21-inch "Cylinder Gate" horizontal wheel with flumes, penstocks, etc.

Haldeman Paper Co., Lockland, Ohio.—30-inch "Cylinder Gate" wheel.

Jay Paper Co., Jay, Me.—First order: 42-inch and 30-inch "Cylinder Gate" wheels with power connections. Second order: 30-inch "Cylinder Gate" wheel with power connection.

Androscoggin Pulp Co., Portland, Me.—48-inch wheel.

Herkimer Paper Co., Lyons Falls, N. Y.—Pair 35-inch horizontal wheels driving pulp grinders.

The Treadwell Mills Paper and Pulp Co., Plattsburg, N. Y.—Eight pairs 27½-inch, and three single horizontal wheels, with flumes, penstocks, etc., complete plant.

Wyman, Flint & Sons, Bellows Falls, Vt.—36-inch horizontal "Cylinder Gate" Victor wheel.

The Nekoosa Paper Co., Nekoosa, Wis.—14 pairs 30-inch, 1 pair 36-inch, and five single 33-inch, 30-inch and 21-inch horizontal "Cylinder Gate" wheels, with iron flumes, etc., complete.

Willamette Pulp and Paper Co., Oregon City, Oregon.

John Edwards Mfg. Co., Port Edwards, Wis.—One pair 39-inch, eleven pairs 33-inch and one 18-inch horizontal Victor wheels, complete plant.

Carolina Fibre Co., Hartsville, S. C.

Freydenburgh Falls Pulp Co., Plattsburg, N. Y.—Eight 33-inch, one 30-inch, one 24-inch, and one 15-inch horizontal "Cylinder Gate" wheels, complete power plant.

Gould Paper Co., Port Leyden, N. Y.—20-inch horizontal wheel. Second order for New Mill: three 45-inch, four 36-inch, and one 18-inch horizontal "Cylinder Gate" wheels with power connections, complete plant.

Bort & Johnson, Chateaugay, N. Y.—One 30-inch, and pair 12-inch horizontal wheels, with flumes, penstocks, etc., complete plant.

Harding Paper Co., Franklin, Ohio.—Three 39-inch "Cylinder Gate" Victor wheels.

Ticonderoga Pulp and Paper Co., Ticonderoga, N. Y.—One 39-inch horizontal and one 21-inch horizontal "Cylinder Gate" Victor wheels.

The Plattsburgh Paper Mill and Bag Co., Plattsburgh, N. Y.—Six pairs of 27-inch horizontal and one pair of 30-inch horizontal Victor turbines.

Gould Paper Co., Lyons Falls, N. Y.—Three 36-inch "Cylinder Gate" Victor turbines.

International Paper Co., Cadyville, N. Y.—One 45-inch horizontal Victor turbine.

Nekonegan Paper Co., Oldtown, Me.—Sixteen single 30-inch and two single 36-inch improved "Cylinder Gate" Victor turbines.

Cushnoc Paper Co., Augusta, Me.—Two 45-inch and one 42-inch vertical "Cylinder Gate" Victor turbines.

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Androscoggin Pulp Co., Lewiston, Me.—Three 27-inch "Cylinder Gate" Victor turbines on horizontal shafts.

Somerset & Kennebec Co., Fairfield, Me.—Eleven (11) 45-inch vertical "Cylinder Gate" Victor turbines, one 36-inch vertical "Cylinder Gate" Victor turbine.

Remington-Martin Co., Watertown, N. Y.—Five 39, one 24, two 21 and one 18-inch horizontal "Cylinder Gate" Victor turbines, complete plant.

FLOUR MILLS.

Pillsbury-Washburn Flour Mill Co., Minneapolis, Minn.—Pillsbury "A" Mill, two 51-inch wheels, 50 feet head, 8,000 barrels per day; Pillsbury "B" Mill, 51-inch wheel, 45 feet head, 4,000 barrels per day; Pillsbury "Anchor" Mill, 42-inch wheel, 45 feet head, 2,000 barrels per day; "Palisade" Mill, 48-inch wheel, 2,500 barrels per day, 50 feet head.

Washburn "A" Mill, Washburn, Crosby & Co., Minneapolis, Minn.—55-inch and two 40-inch wheels, 40 feet head, 5,000 barrels per day.

"Humboldt Mill," Hinkle, Greenleaf & Co., Minneapolis, Minn.—48 feet head, 27-inch "Cylinder Gate" wheel, drives entire Mill, 1,000 barrels per day.

"Galaxy Mill," Cahill, Fletcher & Co., Minneapolis, Minn.—45 feet head, pair 27½-inch horizontal wheels, drives entire mill, 1,500 barrels per day.

"Northwestern Mill," Sidle, Fletcher, Holmes & Co., Minneapolis, Minn.—45 feet head, 44-inch wheel, drives entire mill, 1,500 barrels per day.

"Standard Mills," Minneapolis, Minn.—30 feet head, 44-inch wheel, drives entire mill, 1,100 barrels per day.

Central Milling Co., Niagara Falls, N. Y.—35-inch wheel, 65 feet head, drives entire mill of 2,000 barrels capacity per day.

Mansfield & Hoag, Otsego, Mich.—7 feet head, 35-inch wheel.

Wm. Forsman, Circleville, Ohio.—9 feet head, 25 and 20-inch wheels, displaced overshot and Leffel wheels.

Cedar Milling Co., Cedar City, Utah.—22 feet head, 15-inch wheel.

Jesse Ames' Sons, Northfield, Minn.—9 feet head, two 48-inch wheels, drive entire mill, and displaced six Leffel and two Houston wheels.

Ezra Bostwick, Union City, Mich.—8 feet head, 30 and 25-inch wheels.

Hon. James Emmett, Waverly, Ohio.—18 feet head, 42-inch wheel, displaced overshot.

R. L. Frazee, Frazee City, Minn.—10 feet head, 40-inch wheel.

R. Critchfield, Howard, Knox County, Ohio.—12 feet head, 15-inch wheel, displaced overshot.

E. T. Archibald & Co., Dundas, Minn.—Two 48-inch wheels, 8 feet head, drives entire mill, displaced five Leffel wheels.

Henry Oswald & Son, Minneapolis, Minn.—26 feet head, 17½-inch wheel, drives entire mill, displaced five Bodine-Jonval wheels.

W. W. Cargill & Bro., Hokah, Minn.—7 feet head, 48-inch wheel, drives entire mill, displaced 48-inch Craik and 54-inch Muliken wheels.

Wm. Lea & Son, Wilmington, Del.—25-inch wheel, displaced overshot.

Piqua Milling Co., Piqua, Ohio.—9½ feet head, 35-inch wheel.

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Cornelius Hilliary, Bladensburg, Knox County, Ohio.—10 feet head, 15-inch wheel, displaced overshot.

J. A. Carpenter, Carpentersville, Ill.—8 feet head, 40, 35; and two 30-inch wheels.

Mosley & Motley, Rochester, N. Y.—29 feet head, 17½ inch wheel, displaced 25-inch Tait and 23½-inch Leffel wheels; and 20-inch wheel displaced overshot; drives entire mill.

James Scott & Son, River Forth, Tasmania, Australia.—10 feet head, 17½-inch wheel, to run buhrs and machinery.

A. J. Weingardner, Rushville, Ohio.—15-inch wheel, 9 feet head.

Rankin & Conley, Pall Mall, Tenn.—25-inch wheel, 6 to 8 feet head.

H. Elerding, Sheridan, Ill.—17½ and 12-inch wheels, 11 feet head.

Hillsboro Mill Co., Hillsboro, Wis.—17½ and 12-inch wheels, 16 feet head.

E. Bradfield & Son, Ada, Mich.—35-inch wheel, 5 to 6 feet head.

A. A. Taylor, Mt. Vernon, Ohio.—35-inch wheel, 18 feet head.

Weld & Hill, Medina, N. Y.—17½-inch wheel, 33 feet head.

Cutler & Co., North Wilbraham, Mass.—44 inch wheel, 13 feet head.

Charles N. Flint, Rolla, Mo.—30-inch wheel, 7 feet head, displaced 40-inch Leffel special.

I. H. Detwiler & Co., Toledo, Ohio.—17½-inch wheel, 11 feet head, displaced 20-inch Leffel and gives double the power that wheel did.

Cotton, Dawell & Hamilton, Ottawa, Ill.—25-inch wheel, 26 feet head.

Charles Wells & Co., North Hatfield, Mass.—15-inch wheel, 26 feet head.

Campbell & Son, Ashville, Ohio.—15 and 20-inch wheels, 11 feet head.

Niles Milling Co., Niles, Mich.—35-inch wheel, 9 feet head.

Wells & Dickey, Forest Mills, Minn.—30-inch wheel.

H. L. Wetherald & Son, Connersville, Ind.—20 and 15-inch wheels, 10 feet head, displaced overshots; 35-inch wheel, 10 feet head, displaced New American.

S. C. Stewart, Tyrone, Pa.—Three 20-inch wheels, 9 feet head.

Frame & Luccock, Kimbolton, Ohio.—Two 30-inch wheels, 6 feet head.

Johnson, Perry & Co., Milford, Neb.—30-inch wheel.

Wm. J. Bright & Co., Cooperston, Pa.—17½-inch wheel, 8 feet head.

Hiram Walker, Valley City, Dakota.—25-inch wheel, 8 feet head.

B. M. Dillenger, Green, Iowa.—25-inch wheel.

George Schaff, Westfield, Delaware County, Ohio.—25-inch wheel.

Hyde & Hodges, Hokah, Minn.—35-inch wheel, 6 feet head.

White & Beynon, Lanesboro, Minn.—20-inch wheel, 26 feet head, displaced 30½-inch Leffel wheel, drives entire mill, with large increase of work over old wheel.

Kendall & Smith, Lincoln, Neb.—25-inch wheel, 13 feet head, drives Woodlawn Mill, 125 barrels per day; 30-inch wheel, 10 feet head, drives Capital Mill, 200 barrels per day; 40-inch wheel, 12 feet head.

J. H. White, Mitchell, Davidson County, Dak.—35-inch wheel, 6 feet head.

N. S. Gregg, Circleville, Ohio.—17½-inch wheel in iron flume.

Cleaver & Collins, Cairo, Mich.—20-inch wheel.

Thomas Jones, Columbus, Ohio.—40-inch wheel, 6 to 8 feet head.

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Lofthouse & Hammond, Boroughbridge, Yorkshire, England.—Two 35-inch wheels, 9 feet head.
Deffenbaugh, Lewis & Co., Wichita, Kan.—40-inch wheel, 11 feet head.
John R. Schall, Laurys, Pa.—35-inch wheel.
F. B. Wilson, Fresno City, Cal.—30-inch wheel.
James D. Smith, Elgin, Erie County, Pa.—20 and 15-inch wheels, 8 feet head.
Schrœder & Trottman, Cedarburg, Wis.—20-inch wheel.
Ritter & Horton, Palmyra, Wis.—25-inch wheel, 13 feet head.
Amsden & Clark, Albion, Mich.—25-inch wheel, 8 feet head.
John Hall, Anderson, Ind.—17½, 20, and two 25-inch wheels, 6½ feet head.
T. S. Hayhurst, Waterloo, Wis.—25-inch wheel, 7 feet head, displaced Brooks wheel.
G. & L. D. Marsh, Valley City, North Dak.—25-inch wheel, 8 feet head.
N. D. White & Son, Beaver Falls, Minn.—10-inch wheel, 29 feet head.
H. and T. J. Walker, Fort Ransom, South Dak.—25-inch wheel.
Jasper Lillie, Knoxville, Tenn.—17½-inch wheel.
Frank E. Herchenbach, Wausau, Wis.—40-inch wheel, 6 to 8 feet head.
Samuel H. Watson, Vinton, Iowa.—10 and 17½-inch wheels, 19 feet head.
W. W. Stevens, Mayfield, Ga.—20-inch wheel, 9 feet head, displaced Leffel wheel.
Dr. Wm. Montgomery, Centerville, Hickman County, Tenn.—6-inch wheel, 45 feet head, drives grist mill complete.
M. H. Collins, East Medway, Mass.—35-inch wheel, 6 to 10 feet head.
H. C. Bowen & Son, Cheshire, Mass.—35-inch wheel, 5 feet head.
James Forbes, Chickasaw, Iowa.—20-inch wheel, 8 feet head.
W. Wells, Mill's Mill, N. Y.—10 and 12-inch wheels, displaced overshot wheels.
Ottman Bros., Central Bridge, N. Y.—12 and 15-inch wheels, 15 feet head.
G. W. Hyde & Son, Joliet, Ill.—48-inch wheel, 9 feet head.
C. Seely, Crete, Neb.—48 and 35-inch wheels, 7 feet head.
David G. Williams, Cambria, Wis.—18½-inch wheel.
B. Boorman, Mauston, Wis.—48-inch wheel, 7 feet head.
Nelson Story, Bozeman, Mont.—12-inch wheel, 40 feet head.
C. Arndt & Son, Sheboygan, Wis.—25-inch wheel, 10 feet head.
George W. Tefft, Fredonia, N. Y.—25-inch wheel, 12 feet head.
City of Salem, Salem, Ore.—40-inch wheel, 37 feet head.
Crowther & Dulcos, Ripon, Wis.—15 and 10-inch wheels, 40 feet head.
Jonathan Turley, Mitchell, Ind.—8-inch wheel, drives entire mill.
D. A. Sipe, Altoona, Pa.—25-inch wheel.
Hardesty Bros., Canal Dover, Ohio.—35-inch wheel, 7 feet head.
M. W. Merrill, Richmond, Utah.—17½ and 12-inch wheels, 14 feet head.
M. W. Balkcom, Glenwood, Minn.—17½-inch wheel.
Oconomowoc Mill Co., Oconomowoc, Wis.—35-inch wheel, 7 feet head.
W. A. Coombs, Coldwater, Mich.—30-inch wheel, 14 feet head.
L. Meeker, Evansville, Minn.—25-inch wheel, 18 feet head.
W. D. Dorwin, Durand, Wis.—20-inch wheel.
C. E. Spencer & Co., Ashton, South Dak.—25-inch wheel.
John Russell, Valley City, North Dak.—30-inch wheel.

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Sidney Brown, Ogdensburg, N. Y.—Two 44-inch wheels.
W. H. & D. T. Pence, Georgetown, Ky.—35-inch wheel, 7 feet head.
George A. Smith, Somerset, Mich.—17½-inch wheel in iron flume.
Weber Bros., Tekamah, Neb.—12-inch wheel, 16 feet head.
F. W. Stock, Hillsdale, Mich.—30-inch wheel, 9 feet head.
C. C. White, Valparaiso, Neb.—12-inch wheel.
Meeker & Baronck, Yuba, Wis.—20-inch wheel.
A. Good, Williamsport, Pa.—30-inch wheel, 10 feet head.
Betts & Waldeck, Russell's Place, Ohio.—35-inch wheel, 6 feet head.
Dawson Bros., Pontiac, Mich.—35-inch wheel, 8 feet head.
M. C. Ellis & Son, Sacramento, Cal.—25-inch wheel.
D. Roepke & Bros., Manitowoc, Wis.—25-inch wheel, 12 feet head.
R. H. Fiske, Adrian, Mich.—20-inch wheel, 7 feet head.
Chas. G. Deissner, Waukesha, Wis.—25-inch wheel, 18 feet head.
J. B. Ehrsam, Enterprise, Kan.—40-inch wheel, 10 feet head, displaced Leffel wheel.
Thomas Vore, West Milton, Ohio.—6-inch wheel, 40 feet head, displaced Leffel wheel.
Elbridge Milling Co., Elbridge, N. Y.—25-inch wheel, 8 feet head.
J. G. Eitel, Chaska, Minn.—17½-inch wheel.
S. Parsons, Auburn, Me.—17½-inch wheel.
Dye & Weller, Troy, Ohio.—48-inch wheel, 8 feet head.
Levi Thacker, Preston, Neb.—25-inch wheel, 8 feet head.
Ruhl & Martin, Sommerville, Ore.—15-inch wheel, 19 feet head.
C. Fogarty, Junction City, Kan.—35-inch wheel, 12 feet head.
Albion Milling Company, Albion, Mich.—Two 30-inch wheels, 12 feet head.
Baker & McMillen, Redwood Falls, Minn.—15-inch wheel.
J. E. Wisner, Lisbon, South Dak.—17½ and 15-inch wheels.
S. G. W. Stokes, Alexandria, Neb.—40-inch wheel, 6 feet head.
S. B. Greeley, Foster's Crossing, Ohio.—44-inch wheel, 7 feet head.
Milton Bœrst, Cobleskill, N. Y.—8-inch wheel in iron flume, 40 feet head.
Charles Tygart, Argusville, N. Y.—10-inch wheel, 26 feet head.
Edward Johnson, Zanesville, Ohio.—44-inch wheel, 12 feet head.
J. J. Scott & Bro., Lynchburg, Va.—35-inch wheel, 12 feet head.
W. J. Green, Waterford, Mich.—40-inch wheel.
Morris & Martin, Reed City, Mich.—20-inch wheel, 12 feet head.
Foster & Bro., Atlanta, Ga.—35-inch wheel.
J. Wood, Savanna, Ill.—20-inch wheel.
Cyrus Leeds, Jr., Shadesville, Ohio.—25-inch wheel.
Wm. Zuck, Easton, Pa.—30-inch wheel, 8 feet head.
Underwood & Co., Salina, Kan.—44 and 35-inch wheels.
Paris Milling Co., Paris, Ky.—40 and 20-inch wheels, 9 feet head.
J. H. Foster & Co., Albany, Ore.—25-inch wheel.
J. F. Long, Summer Hill, Pa.—15-inch wheel, 10 feet head.
John Fisher, Rockfield, Ind.—17½-inch wheel.

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Beloit Milling Co., Beloit, Kan.—44-inch wheel.
John K. Fisher, Auburn, Pa.—17½-inch wheel.
Amos Bros., Syracuse, N. Y.—17½-inch wheel, 25 feet head.
N. B. Floyd, Lynchburg, Va.—17½-inch wheel.
S. C. Wagner, Big Springs, Pa.—30-inch wheel, 7 feet head.
George Falkenmeyer, Elizabethville, Pa.—25-inch wheel.
M. J. Bush, Niantic, Conn.—30-inch wheel, 10 feet head.
J. C. Mohrman & Co., Syracuse, Neb.—20-inch wheel, 16 feet head.
Wm. H. Aaron, Curry Station, Blair County, Pa.—30-inch wheel.
Wm. Saunders, Unadilla, Neb.—17½-inch wheel, 15 feet head.
C. C. & L. A. Nickells, Nickells Mills, W. Va.—Two 17½-inch wheels.
D. M. Hunsicker, Trowbridge, Pa.—Two 35-inch wheels.
Iver Pederson, Ettrick, Wis.—30-inch wheel.
Stanfield & Macey, Siloam Springs, Ark.—15-inch wheel.
F. & I. Metzer, Holidaysburg, Pa.—30-inch wheel.
A. Hoag & Co., Ionia, Mich.—30-inch wheel.
George W. Keller, Tiffin, Ohio.—30-inch wheel, 8 feet head.
Anthony Fisher, Green Valley, Ill.—Two 35-inch wheels.
Beckman Bros., Noah, Tenn.—20-inch wheel.
T. W. Sheldon, Herman, N. Y.—15-inch wheel.
A. Beyer, New Philadelphia, Ohio.—Two 40 and one 35-inch wheels, displaced Little Giant Wheels.
C. A. Smith, East Troy, Wis.—25-inch wheel, 11 feet head.
Frace & Harvey, Saranac, Mich.—17½-inch wheel, 20 feet head.
T. P. Boyd & Son, Boyd, Ore.—17½-inch wheel.
Baughman & Cromwell, Xenia, Ohio.—30-inch wheel.
Charles W. Ellis, Dubois, Ind.—35-inch wheel, 7 feet head.
Austin Mill Co., Austin, Kan.—40-inch wheel, 7 feet head.
D. L. Johnsen, Yorkville, Mich.—20-inch wheel.
A. K. Lair, Georgetown, Ky.—35-inch wheel, 10 feet head.
D. H. Turner, Pearsons Mills, Ala.—Two 12-inch wheels, 15 feet head.
Littlejohn & Allen, Waukesha, Wis.—35-inch wheel.
E. M. Henry & Bro., North Bennington, Vt.—30-inch wheel, 8 feet head.
Roller King Mill Co., Yakton, South Dak.—10-inch wheel, 32 feet head.
J. S. Studebaker, Yellow Creek, Ill.—30-inch wheel.
Peter Funk, Marion, Kan.—30-inch wheel, 9 feet head.
D. L. Chambers & Son, Latrobe, Pa.—35-inch wheel.
I. T. McComas & Son, Ijamsville, Md.—25-inch wheel, 10 feet head.
F. M. Webber, Elk Falls, Kan.—35-inch wheel, 12 feet head.
Kohl & Kleuter, San Bernardino, Cal.—20 and 12-inch wheels, 18 feet head.
A. M. Couden & Bro., Morrow, Ohio.—40-inch wheel, 7 feet head, displaced 56-inch Leffel.
Union Mill Co., Comet, Ohio.—12-inch wheel, 26 feet head, displaced overshot.
James M. Kerr, Titusville, Pa.—25-inch wheel, 9 feet head, displaced 48-inch Noye wheel.

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Packard & Black, Neshannock Falls, Pa.—30-inch wheel, displaced 48-inch Bryson wheel.
W. P. Lindale, Wyoming, Del.—30-inch wheel.
Samuel Carson, Galesburg, Mich.—Two 17½-inch wheels, 13 feet head.
Platt, Barnes & Co., Rock Dale Mills, Mass.—15 and 10-inch wheels.
O. P. Posey, Whitewater, Wis.—20-inch wheel.
Mason, Cook & Co., Bonsack, Roanoke County, Va.—20-inch wheel.
J. Turner & Son, Blanchard, Iowa.—30-inch wheel.
Stratton Merrill & Co., Penacook, N. H.—35-inch wheel, 18 feet head.
J. H. Rhinehart & Son, Summerville, Ore.—17½ and 15-inch wheels, 21 feet head.
Horton & Son, Delavan, Wis.—35-inch wheel.
Curtis & Clark, Spokane, Wash.—30-inch wheel, 30 feet head.
Wm. Wilson, Twin Lakes, Minn.—25-inch wheels.
Pierce Mill Co., Pierce, Neb.—30-inch wheel, 12 feet head.
A. D. Sherman, Westfield, Mass.—25 and 12-inch wheels, 11 feet head.
E. S. Garrison, Moorton, Kent County, Del.—25-inch wheel.
Jonas Fourshee, Stockton, London County, Tenn.—Two 10-inch wheels, 19 feet head.
C. G. A. Voight & Co., Grand Rapids, Mich.—55-inch wheel.
Black River Milling Co., Bangor, Mich.—40-inch wheel.
Geis & Gibbs, New Cambria, Saline County, Kan.—44-inch wheel.
H. B. Groff, Fertility, Lancaster County, Pa.—35-inch wheel.
W. H. Veach, West Middlesex, Pa.—Two 40-inch wheels, 5 feet head.
James Mathers & Son, Greenville, Pa.—35-inch wheel.
S. F. McDonald, Oxford Mills, Iowa.—35-inch wheel, displaced 40-inch Leffel.
Sorlein Bros., Redwood Falls, Minn.—17½ and 15-inch wheels, 15 feet head.
J. L. Packard, Running Water, South Dak.—20-inch wheel.
J. B. Cotrel, Bridgeville, Sussex County, Del.—44-inch wheel.
E. Kindell & Co., Pleasant Hill, Ohio.—30-inch wheel.
J. C. Langhorne, Salem, Va.—30-inch wheel, 9 feet head.
J. H. Nyman, Bangor, Mich.—Two 25-inch wheels, 11 feet head.
David Hardesty, Shady Bend, Kan.—15-inch wheel.
Wm. Howell, Catawissa, Pa.—15-inch wheel.
Beaumont & Blankenbuehler, Zanesville, Ohio.—35-inch wheel, 13 feet head.
Scott, Dempster & Co., Knoxville, Tenn.—15-inch wheel, 13 feet head.
Baldwin & McGary, Urbana, Ohio.—20-inch wheel in flume, displaced overshot.
Wetherald Bros., Hebron, Neb.—Two 30-inch wheels, 7 feet head.
Kendall & Tefft, Greenwood, Neb.—25-inch wheel.
G. W. Nicewanner, Piqua, Ohio.—35-inch wheel, 7 feet head.
Thon & Hamm, St. Paul, Minn.—15-inch wheel, 36 feet head.
Russell & Miller Milling Co., Jamestown, Dak.—35-inch wheel, 12-inch head, displaced an "American."
Ross Kuydendall, Plymouth, Ohio.—15-inch wheel.
Lock & McCandless, Grove City, Mercer County, Pa.—30-inch wheel.
S. C. Hurt & Son, Lynchburg, Va.—Three 35-inch wheels.

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Whitney & Wilson, Rochester, N. Y.—Two 17½ and one 12-inch wheels on horizontal shafts.

Hoisington & Fout, Battle River, Custer County, Dak.—12-inch wheel, 40 feet head.

J. W. & S. T. Johnson, Friendship, Ind.—30-inch wheel.

Sweet, Mongin & Cook, Waterloo, N. Y.—Two 44-inch wheels, 7 feet head.

Fish & Mayhew, Eau Claire, Wis.—25-inch wheel.

Pioneer Milling Co., Sacramento, Cal.—20-inch wheel.

W. & A. McArthur, Cheboygan, Mich.—40 and 35-inch wheels.

A. C. Parfrey, Richland Center, Wis.—35-inch wheel.

E. Boutwell & Son, Troy, N. Y.—55-inch special wheel, 9 feet head.

Piqua Oat Meal Co., Piqua, Ohio.—35-inch wheel, 5 feet head.

J. P. Simpson, Columbus, Ohio.—25-inch wheel.

Jacob Blosser, Chillicothe, Ohio.—20-inch wheel.

Hoffman Bros. & Co., Dillon, Kan.—20-inch wheel.

Bazile Mill Co., Bazile Mills, Neb.—15-inch wheel, 19 feet head, and 35-inch wheel, 13 feet head.

Jacob Holchew, Ironton, Ohio.—35-inch wheel.

Jacob Renner & Son, West Jefferson, Ohio.—17½-inch wheel.

W. C. Culbertson & Co., Girard, Pa.—10-inch wheel.

H. M. Spaulding, Concordia, Kan.—44-inch wheel, 7 feet head.

The Goshen Milling Co., Goshen, Ind.—48-inch wheel, 14 feet head.

M. Britton, Napoleon, Ohio.—30-inch wheel, 18 feet head.

H. M. Moore, Columbia, Pa.—25-inch wheel.

Campbell Bros., Austin, Minn.—17½-inch wheel.

Anchor Milling Co., Mt. Gilead, Ohio.—17½-inch wheel, 26 feet head.

Shick & Wamsher, Port Clinton, Schuylkill County, Pa.—35-inch wheel (made entirely of gun metal), 10 feet head.

Henry Wolf & Sons, Kings Creek, Ohio.—15-inch wheel.

G. P. O. Kimball, Ravensbeque, Mesa County, Col.—15-inch wheel, 16 feet head.

W. P. Huff, Roanoke, Va.—17½-inch wheel.

M. H. Webster & Son, Kendall Mills, N. Y.—30-inch wheel, 11 feet head.

Theo. Amerman, South Branch, N. J.—35-inch wheel, 5½ feet head.

Sublet & Dooley, Allegheny Springs, Va.—15-inch wheel.

Brinn & Anderson, Redwood Falls, Minn.—20-inch wheel, 16 feet head.

R. L. Cox, Louisville, Tenn.—17½-inch wheel.

S. & J. Cleaver & Sons, Chestnut Hills, Philadelphia, Pa.—40-inch wheel, 6 feet head.

C. Burkhardt, Burkhardt, Wis.—Two 17½-inch wheels on horizontal shaft, 25 feet head.

Patterson & Fry, Bluff City, Tenn.—35 and 20-inch wheels.

Studebaker & Son, Farmland, Ind.—17½-inch wheel.

T. H. Howell, Camden, Del.—25-inch wheel.

A. M. Hull, Ithaca, N. Y.—17½-inch wheel, displaced Leffel.

J. G. Bergsten, Lindsborg, Kan.—30-inch wheel.

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Courtwright & Son, Homer, Mich.—40-inch wheel, 7 feet head.
M. H. Amisdon, Independence, Wis.—15-inch wheel.
Shœllkopf & Mathews, Niagara Falls, N. Y.—44 and 20-inch wheels, 70 feet head.
Norton & Co., Lockport, Ill.—35-inch wheel.
J. G. Davis & Co., Rochester, N. Y.—20-inch wheel on horizontal shaft, 90 feet head. (See engraving.)
James Wilson & Co., Rochester, N. Y.—35-inch wheel.
Henry Beckman, Oakdale, Neb.—25-inch wheel.
Baer & Mohler, Covington, Ohio.—25-inch wheel.
M. W. Merrill, Richmond, Utah.—25-inch wheel.
I. W. Groff, Millersburg, Pa.—30-inch wheel.
Charles A. Pillsbury & Co., Minneapolis, Minn.—25-inch wheel on horizontal shaft with flume, governor, etc., complete power plant, 40 feet head.
Wm. Craig & Co., New Bethlehem, Pa.—40-inch wheel.
T. J. Elam, Murfreesboro, Tenn.—30-inch wheel.
James Mack, Smithfield, Utah.—27½-inch wheel, displaced Craig "Perfection" wheel.
Mitchell & Brown, Maumee, Ohio.—25-inch wheel.
Arkansas City Milling Co., Arkansas City, Kan.—40-inch wheel.
Kenneman & Lowry, Newton Falls, Ohio.—25-inch wheel.
Handy & Smith, Fresno, Cal.—20-inch wheel.
Scott, Dempster & Co., Knoxville, Tenn.—17½-inch wheel.
Bravinder & Keats, Spokane Falls, Wash.—30-inch horizontal wheel, governor, etc.
Yorkville Milling Co., Yorkville, Mich.—22½-inch wheel and power connections.
A. C. Parfrey, Richland Center, Wis.—40-inch wheel and power connections.
H. B. Lane, Rio, Ky.—10-inch horizontal wheel and power connections.
Elizabeth G. E. Bates, Lancaster, Pa.—35 and 27½-inch wheels.
Poland Milling Co., Poland, Ohio.—35-inch wheel.
W. Gates & Son, Bedford, Ohio.—12-inch horizontal, with flume, feeder, etc.
C. C. Washburn Flouring Mills Co., Minneapolis, Minn.—Two 40-inch with heavy gears and power connections.
Elling & Hyndman, Sheridan, Mont.—12-inch horizontal, with power connections.
"The Galaxy Mills," Minneapolis, Minn.—Pair 27½-inch horizontal wheels, flume, etc.
Isaac Bushong, Bird-in-hand, Pa.—25-inch wheel.
Charter Oak Rolling Mill Co., Black River Falls, Wis.—17½-inch horizontal wheel with power connections.
Thatcher Milling and Elevator Co., Logan, Utah.—32½-inch wheel with power connections.
Sidle-Fletcher-Holmes Co., Zenith Mill, Minneapolis, Minn.—Pair 35-inch on horizontal shaft.
D. R. Barber & Sons, "Cataract Mills."—27-inch "Cylinder Gate" wheel and power connections.
Preston Milling Co., Waitsburg, Wash.—21-inch wheel and gears.
Otter Creek Roller Mill Co., Eau Claire, Wis.—22½ and 17½-inch wheels.
Ranchman's Last Chance Milling and Elevator Co., Delta, Col.—35-inch wheel.

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Alex Laws & Son, Dover, Del.—30-inch wheel and governor.

Delroy Gitchell, Vang, N. Dak.—17½-inch wheel.

Northwestern Con. Milling Co., Minneapolis, Minn.—One 25-inch horizontal wheel for "Petit Mill"; two 36-inch "Cylinder Gate" wheels with power connections for "Crown Roller Mill"; one 54-inch "Cylinder Gate" wheel for "Columbia Mill."

Minneapolis Flour Mfg. Co., Minneapolis, Minn.—35-inch with Bronze Buckets for "Minneapolis Mill."

The Rapidan Milling Co., Rapidan, Minn.—One pair 17½-inch horizontal wheels.

Rounsaville & Bro., Rome, Ga.—12-inch and 15-inch wheels; displaced "Davis" wheel.

Des Plaines Valley Co., Lockport, Ill.—44-inch wheel.

Champion Mill Co., Lebanon, Ore.—32½-inch wheel and power connections complete.

Fr. Hagemeister, Farmers Valley, Neb.—27½-inch wheel.

Allen & Dumas Co., Juliette, Ga.—Two 35-inch wheels with power connections.

R. D. Parsons, Cazenovia, N. Y.—21 and 15-inch "Cylinder Gate" wheels.

Nelson, Story & Co., Bozeman, Mont.—Pair 12-inch horizontal wheels.

Stoddard & Haslen, Wellsville, Utah.—22½-inch wheel.

Bazile Mills Co., Bazile Mills, Neb.—25-inch wheel, iron flume, foundation beams, etc.

Robert Denny, Smyrna, Del.—27½-inch wheel.

Drone & Co., Zanesville, Ohio.—Two 39-inch upright "Cylinder Gate" wheels.

Marquette Milling Co., Marquette, Kans.—One 27½-inch upright "Register Gate" wheel.

Dubois Milling Co., Dubois, Ind.—One 42-inch upright "Cylinder Gate" wheel.

Hillsboro Milling Co., Hillsboro, Wis.—One 15-inch upright Victor wheel.

Jas. S. Miller, Sunneytown, Pa.—One 30-inch upright hand "Register Gate" Victor wheel.

SAW MILLS.

Francis King, Feeding Hills, Mass.—Saw mill at Agawam, 17 feet head, 15-inch wheel, displaced 30-inch Clark & Chapman wheel.

Morton & Spellman, Williamsburg, Mass.—26 feet head, 12-inch wheel, circular saw mill.

Truckee Lumber Co., Truckee, Cal.—35-inch wheel, saw mill, etc.

L. M. Weatherhead, Bernardston, Mass.—17½-inch wheel, 16 feet head, circular saw and shingle mill.

Pickett Bros., West Northfield, Mass.—15-inch wheel, 25 feet head, circular saw mill.

J. A. C. Blackburn, War Eagle Mills, Ark.—35-inch wheel, 7 feet head, circular saw, etc.

M. V. Stow, Westfield, Mass.—15-inch wheel, 16 feet head, circular saw mill.

Thos. W. Tucker, Tekonsha, Mich.—30-inch wheel, 7 feet head.

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C. J. Shuttleworth, Springville, Erie County, N. Y.—25-inch wheel, 12 feet head, circular saw mill.

C. D. Whitemore, Montague, Mass.—12-inch wheel, 20 feet head, circular saw mill.

U. P. Wade, Sylvania, Ga.—15-inch wheel, drive circular saw.

H. A. Oakman, box factory, North Marshfield, Mass.—17½-inch wheel, 11 feet head.

Water Power Co., Cloquet, Minn.—Two 55-inch wheels, 16 feet head.

Bruch, Borrow & Henry, Granville Corners, Mass.—12-inch wheel in iron flume, 30 feet head, circular saw.

D. A. Kern, Troxelville, Snyder Co., Pa.—20-inch wheel.

E. P. McCornack, Salem, Ore.—30-inch wheel.

B. E. Moore, Tolland, Mass.—12-inch wheel, 18 feet head.

Charles Gibbs, North Blanford, Mass.—15-inch wheel, 20 feet head.

A. J. Palmer, Waynesboro, Va.—30-inch wheel.

H. L. Spear, West Suffield, Conn.—17½-inch wheel, 13 feet head.

Jim Pearce, Pearce's Mills, Ala.—20-inch wheel, 10 feet head.

Wilson & Brierly, Beaver Falls, Pa.—25-inch wheel, 15 feet head.

H. Elmer & Son, Buckland, Mass.—15-inch wheel.

N. H. Colburn, Frewsburg, N. Y.—12-inch wheel.

John L. Hoard, Frankfort, Herkimer Co., N. Y.—17½-inch wheel, 20 feet head.

W. L. McManus, Petoskey, Mich.—35-inch wheel.

Yingling Bros., Seven Mile, Ohio.—25-inch wheel.

Sampson Hoch, Doro, Wabash Co., Ind.—35-inch wheel, displaced 48-inch "American."

Lewis E. Stafford, Monroe, Franklin Co., Mass.—12-inch wheel.

Wm. Scott, Rapid City, Dak.—25-inch wheel, 16 feet head.

Dennysville Lumber Co., Dennysville, Me.—27-inch "Cylinder Gate" wheel.

A. & P. B. Young, Hiram, Me.—25-inch wheel, 11 feet head.

Spokane Mill Co., Spokane Falls, Wash.—Pair 30-inch horizontal, with power connections.

William Blitz, Tylertown, Pa.—15-inch wheel.

Daniel Leonard, Feeding Hills, Mass.—15-inch wheel in iron flume.

David Andrus, Perry, N. Y.—17½-inch wheel, with power connections.

Wm. Burton's Sons, Waterford, N. Y.—Pair 22½-inch horizontal, with power connections complete.

MISCELLANEOUS.

P. H. Standish, chain works, Cuyahoga Falls, Ohio.—10 feet head, 20-inch wheel.

Falls Wire Mfg. Co., Cuyahoga Falls, Ohio.—16 feet head, 25-inch wheel, displaced 30½ and 20-inch Thos. Leffel wheels.

Union Water Power Co., Unionville, Conn.—18 feet head, 25-inch wheel.

Pond & Hart, manufacturers of hardware, Unionville, Conn.—18 feet head, 25-inch wheel.

Wm. R. Hartigan, Burlington, Conn.—Wood-working machinery. 21 feet head, 15-inch wheel, displaced 24-inch Alcott wheel.

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E. J. Du Pont de Nemours & Co., powder works, Wilmington, Del.—18 feet head, 15-inch wheel, displaced overshot.

Tiffin Water Works, Tiffin, Ohio.—35-inch wheel, 9 feet head.

Wm. E. Thayer, hardware factory, Williamsburg, Mass.—8-inch wheel, 45 feet head, displaced overshot.

City Water Works, Three Rivers, Mich.—30-inch wheel.

Northampton Cutlery Works, Northampton, Mass.—30 and 17½-inch wheels, 21 feet head.

Thresher & Co., Dayton, Ohio.—Varnish manufacturers. 10-inch wheel, 9 feet head.

Niles Tool Works, Hamilton, Ohio.—17½ and 15-inch wheels, 26 feet head, displaced 25-inch "American."

Ames & Thayer, Cazenovia, N. Y.—Sash, door and blind factory. 12 feet head, 30-inch wheel; displaced two wheels.

A. B. & C. D. Stuart, Otsego, Mich.—Chair factory. 7 feet head, 48-inch wheel.

American Whip Co., Westfield, Mass.—Whip factory. 25-inch wheel, 5 feet head.

Miami Powder Co., Xenia, Ohio.—15-inch wheel, 9 feet head, displaced overshot.

Wiley & Russell Mfg. Co., Greenfield, Mass.—Pair 27½-inch horizontal wheels, 14 feet head.

Beven Bros. Mfg. Co., East Hampton, Conn.—Manufacturers of bells. 8-inch wheel.

Wm. Wilcutt, Plainfield, Mass.—Handle factory. 15-inch wheel, 16 feet head.

C. S. Shattuc, Hatfield, Mass.—Manufacturer of pistols. 12-inch wheel, 26 feet head.

The Ottawa Tile Co., Ottawa, Ills.—20-inch wheel, 21 feet head.

Rogers & Spurr Mfg. Co., Greenfield, Mass.—Manufacturers of plated ware. 6-inch wheel in iron flume, 26 feet head.

Hill Bros., Williamsburg, Mass.—Manufacturers of buttons, etc. 20 and 15-inch wheels, 26 feet head.

J. S. Graham & Co., Rochester, N. Y.—Manufacturers of machinery. 8-inch wheel in iron flume, 73 feet head.

W. H. Gorsline, Rochester, N. Y.—Rents room and power. 15 and 12-inch wheels in iron flumes, under 84 feet head.

Illinois Starch Co., Ottawa, Ills.—15-inch, two 20, 25-inch, and 30-inch wheels, 26 feet head.

Mill River Button Co., Leeds, Mass.—30-inch wheel, 12 feet head.

O. H. Smith, Carpentersville, Ills.—Planing mill, etc. 7 feet head, 48-inch wheel; displaced Leffel wheel.

H. A. Weldy & Co., Tamaqua, Pa.—Manufacturers of powder. 25-inch wheel.

Alfred Dolge, Dolgeville, N. Y.—Manufacturers of piano goods. 30-inch wheel, and pair of 35-inch on horizontal shaft.

City Water Works, Appleton, Wis.—30 and 25-inch wheels in iron flumes, 10 feet head.

Leonard & Blackie, twine mill, Piqua, Ohio.—20-inch wheel, 16 feet head.

The Piqua Mfg. Co., Piqua, Ohio.—Mattress goods. 25-inch wheel, 16 feet head.

Briggs & Whorton, Appleton, Wis.—Sash and blinds. 48-inch wheel, 11 feet head.

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C. N. Marshall, Tolland, Mass.—Manufacturer of woodenware. 12 and 10-inch wheels.

The Meech & Hart Co., Unionville, Conn.—Cutlery. 30-inch wheel, 19 feet head.

The Hydraulic Power Co., Milwaukee, Wis.—Three 48-inch wheels in iron flumes, under 45 feet head, for compressing air for mining purposes.

Seidel Bros., Marysville, Perry county, Pa.—15-inch wheel in iron flume, 19 feet head.

Samuel Horton, Westfield, Mass.—Manufacturer of whips. 30-inch wheel, 8 feet head.

Milwaukee L. S. & W. R. R. Co., Milwaukee, Wis.—General repair shops. 40-inch wheel, 15 feet head.

Niagara Falls Hydraulic and Mfg. Co., Niagara Falls, N. Y.—20-inch wheel, 80 feet head.

S. W. Hutchins, Lewiston, Me.—17½-inch wheel, 34 feet head.

A. L. Williston, Northampton, Mass.—20-inch wheel.

City Water Works, Rochester, Minn.—20-inch wheel.

Illinois Iron and Bolt Co., Carpentersville, Ills.—48-inch wheel, 7 feet head.

Kimball Bros., Lynn, Mass.—Shoe manufacturers. 15-inch wheel, 41 feet head.

I. C. Towner, Elgin, Ills.—Two 48-inch wheels, 6 feet head.

Daniels Machine Co., Woodstock, Vt.—40-inch wheel, 9 feet head.

Richmond Mfg. Co., Lockport, N. Y.—10-inch wheel, 57 feet head.

The Charles Parker Co., Meriden, Conn.—8-inch wheel, 90 feet head.

Frederick Post, Spokane Falls, Wash.—40, 30, 25 and 20-inch wheels.

Spokane Falls Water Co., Spokane Falls, Wash.—40-inch wheel; drives water-works.

City Water Works, Petoskey, Mich.—30-inch wheel; displaced Leffel wheel.

Maramac Iron Co., St. James, Mo.—30-inch wheel.

Downing, Van Zandt & Co., Orbisonia, Pa.—Coal miners. 12-inch wheel, 20 feet head.

Chicago & Dayton Brick Co., Dayton, Ills.—Two 35-inch wheels, 17 feet head.

Conger Mining Co., Prescott, Arizona.—Gold mine. 15-inch wheel.

James Brook, Trenton, N. J.—Rubber goods. 35-inch wheel.

The Ohio Iron Wheel Co., Hamilton, Ohio.—12-inch wheel, 13 feet head; displaced overshot.

Laconia Savings Bank, Laconia, N. H.—25-inch wheel.

Barney & Kilby, Sandusky, Ohio.—25-inch wheel.

J. P. Rowlett, Tobacco Port, Tenn.—15-inch wheel.

Hospital for the Insane, Knoxville, Tenn.—12-inch wheel in iron flume, 19 feet head.

R. P. Jackman & Son, Elgin, Ills.—35-inch wheel, 6 feet head.

Allen, Lane & Co., Warren, Me.—44-inch wheel, 9 feet head.

Whetstone & Co., Cincinnati, Ohio.—Linseed oil mill. 25-inch wheel, 15 feet head; displaced 40-inch Kindlebarger wheel.

Falls Rivet Co., Cuyahoga Falls, Ohio.—25-inch wheel, 11 feet head; displaced 35-inch Leffel wheel.

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Marseilles Mfg. Co., Marseilles, Ills.—48-inch wheel; displaced 60-inch "American."
Marsh & Speer, Joliet, Ills.—25-inch wheel.
W. P. Richardson, North Londonderry, N. H.—17½-inch wheel.
Reeve & Chester, Cuyahoga Falls, Ohio.—20-inch wheel.
Troy Water Works Co., Troy, Ohio.—35 and 15-inch wheels in iron flumes.
McHose & Lyons, Dayton, Ohio.—30-inch wheel, 8 feet head; displaced an "American."
Clemens & Faust, New Braunfels, Texas.—35-inch wheel.
Excelsior Starch Mfg. Co., Elkhart, Ind.—30-inch wheel, 10 feet head.
M. J. Dewey, Bloomingdale, N. J.—Manufacturers of rubber. 25-inch wheel.
Upper Appomatox Co., Petersburg, Va.—30-inch wheel.
C. G. Hudnut, Big Rapids, Mich.—48-inch wheel, 8 feet head.
W. N. Hamilton, Ottawa, Ill.—Water works. 30 and 10-inch wheels in iron flume.
D. C. Cook Publishing Co., Elgin, Ill.—44-inch wheel.
Newberry & Chapman, Guilderland, N. Y.—Foundry. 15-inch wheel.
A. F. & H. C. Waldron, Farmington, N. H.—Box factory. 17½-inch wheel, 25 feet head.
W. T. Harper & Co., Ottumwa, Iowa.—Oil mill. 48-inch wheel.
J. W. & C. A. Wakefield, Bennington, Vt.—Novelty works. 15-inch horizontal Victor.
City Water Works, Raleigh, N. C.—30 and 25-inch wheels on horizontal shafts.
St. Louis Mexican Investment and Improvement Co., State of Jalisco, Mexico.—25-inch wheel, 30 feet head.
King, Hamilton & Co., Ottawa, Ill.—10-inch wheel.
George R. Lombard & Co., Augusta, Ga.—30-inch wheel.
City Water Works, Baxter Springs, Kas.—Two 48-inch wheels.
Muskingum Coffin Co., Zanesville, Ohio.—35-inch wheel.
James Gallery's Sons, Eaton Rapids, Mich.—30-inch wheel, 7 feet head.
D. B. Wesson, Northboro, Mass.—12-inch wheel on horizontal shaft.
Kearney Canal and Water Supply Co., Kearney, Neb.—Pair 15-inch wheels on horizontal shaft, 48 feet head, drive electric light and other machinery.
Empire Drill Co., Shortsville, N. Y.—25-inch wheel, 14 feet head.
City Water Works, Piqua, Ohio.—25-inch and 30-inch wheels on horizontal shafts; displaced "American."
Ropes Gold and Silver Co., Ishpeming, Mich.—20-inch wheel.
Holly Manufacturing Co., Lockport, N. Y.—25-inch wheel, 50 feet head.
E. H. Clapp, Hanover, Mass.—Rubber works. 44-inch and 25-inch wheels.
Burley & Urshur, Milton, N. H.—Boot and shoe factory. 40-inch wheel.
W. G. Alden, Camden, Me.—35-inch wheel.
Gary Bros. & Silvey, Zanesville, Ohio.—35-inch wheel.
Wood Linseed Oil Co., Piqua, Ohio.—25-inch wheel.
City Water Works, Connersville, Ind.—30 and 15-inch wheels.
P. H. & F. M. Roots Co., Connersville, Ind.—15-inch wheel.
W. A. Edwards & Co., Graniteville, S. C.—15-inch wheel.

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Bristol Water Works, Bristol, Tenn.—Pair 6-inch wheels on horizontal shaft, complete.

Thomas Holman, Salem, Ore.—40-inch wheel.

City Water Works, Spokane Falls, Wash.—35, 30 and 25-inch wheels, 31 feet head.

Willamette Excelsior Co., Oregon, City, Ore.—20 and 15-inch wheels, 30 feet head.

Cable Railway Co., Spokane Falls, Wash.—Pair 10-inch wheels on horizontal shaft, complete plant, 65 feet head.

Merrimac Wheel and Gear Co., Merrimac, Mass.—12-inch wheel on horizontal shaft, with flumes, etc.

Ames Bros., Silverton, Ore.—30-inch wheel.

Falls Rivet and Machine Co., Cuyahoga Falls, Ohio.—35-inch wheel.

U. S. Government, for Monongahela River Improvement.—Four 15-inch wheels.

G. W. Nelson, Red Bank, S. C.—25-inch wheel.

George Juengst & Son, Croton Falls, N. Y.—30-inch and 25-inch wheels.

Gardono Mining Co., City of Mexico, Mex.—Two 20-inch wheels, with flumes and power connections.

The Bagley & Sewell Co., Watertown, N. Y.—44-inch wheel.

Zion's Co-operative Mercantile Institution, Salt Lake City, Utah.—15-inch horizontal wheel, governor, etc.

Lynchburg Drug Co., Lynchburg, Va.—35-inch wheel.

Mt. Pleasant Mining Co., Port Oram, N. J.—Pair 15-inch horizontal wheels.

Washington Water Power Co., Spokane Falls, Wash.—One 25-inch, two pair 15-inch, and 6 pair of 10-inch horizontal wheels, with flumes, governors and connections.

Chas. N Cox, Grand Junction, Col.—One 44-inch wheel, with pump and power connections, for irrigating plant.

Willamette Transportation and Locks Co., Oregon City, Ore.—Two 35-inch wheels.

J. I. VanDoren, Phœnix, N. Y.—Two 55-inch wheels, with heavy gears, etc.

The Glamorgon Co., Lynchburg, Va.—25-inch wheel.

A. C. Williams, manufacturer of hardware, Chagrin Falls, Ohio.—One pair 17½-inch horizontal and one 20-inch wheel.

Union School Furniture Co., Battle Creek, Mich.—Two 30-inch wheels, with gears, etc.

Boston and Maine Railroad Co., Saco, Me.—20-inch horizontal wheel, with power connections.

E. W. Haynes, machine shop, Franklin Falls, N. H.—6-inch horizontal wheel.

Twin City Iron Works, Minneapolis, Minn.—8-inch horizontal wheel.

City Water Work, East Aurora, N. Y.—30 and 17½-inch, with gears, etc.

City Water Works, Oregon City, Ore.—30-inch horizontal, with flume, etc.

City Water Works, North Yakima, Wash.—Two 15-inch horizontals, with flumes, etc.

Niagara Falls Hydraulic Power and Manufacturing Co., Niagara Falls, N. Y.—15-inch horizontal wheel, flume, etc., complete.

City Water Works, Columbia, S. C.—Two 48-inch horizontal wheels.

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George Juengst & Son, Croton Falls, N. Y.—25-inch wheel.

Boston and Montana C. C. and S. Mining Co., Great Falls, Mont.—First order: One 44, one 40, one pair 22½, and one pair 20-inch horizontal wheels, with flumes, penstocks, and power connections, complete. Second order: One 40-inch and one 20-inch horizontal wheels, with power connections complete. After two years' use, they placed with us their third order, consisting of one pair 48-inch, one single 48-inch, and one 36-inch "Cylinder Gate" horizontal wheels, with flumes, penstocks, etc., complete; followed by fourth order for one pair 39-inch and one pair 36-inch horizontal "Cylinder Gate" wheels, with power connections, complete.

Gothenburg Water Works and Investment Co., Gothenburg, Neb.—One pair 22½-inch horizontal wheels, with governors and connections complete.

U. S. Government, for Muskingum Ice Harbor, Marietta, Ohio.—Two 20-inch wheels.

Wm. T. Powers, Grand Rapids, Mich.—30-inch wheel and power connections.

John P. Russell, Napanock, N. Y.—Two 17½-inch horizontal wheels, with flume, governors, etc.

Salem Iron Works, Salem, Ore.—15-inch horizontal wheel.

American Fire Engine Co., Seneca Falls, N. Y.—55-inch wheel, with iron flumes, gears, governor, etc.

Great Falls Water Power Co., Great Falls, Mont.—48-inch "Cylinder Gate" horizontal wheel, with flume, penstock, and power connections.

City Water Works, Ogdensburg, N. Y.—Two 36-inch "Cylinder Gate" wheels, with gears, etc.

Daniel Pratt Estate, Prattville, Ala.—48-inch wheel.

Prosser Falls Irrigation Co., Prosser, Wash.—Two 48-inch wheels and pumps; complete plant.

Oxford Light Co., Norway, Me.—21-inch and 18-inch single horizontal "Cylinder Gate" wheels.

Jonas Spaulding, South Milton, N. H.—Pair 32-inch horizontal "Cylinder Gate" wheels.

Williams, Barnett & O'Brien, Lynchburg, Va.—One 32½-inch upright Victor wheel.

Vermont Marble Co., Proctor, Vt.—One pair of 27-inch horizontal "Cylinder Gate" Victor Turbines.

Water Works, Waupaca, Wis.—Two upright Victor Turbines.

Hilton Bridge Construction Co., Albany, N. Y.—One 15-inch "Cylinder Gate" Victor Turbine.

Louis E. Springer, Elkton, Md.—One 25-inch "Register Gate" Victor Turbine.

Stiles & Waldorf, Lewiston, Mont.—One 27-inch upright "Register Gate" Victor Turbine.

S. Wesley Hutchins, Auburn, Me.—One 17½-inch upright "Register Gate" Victor Turbine.

Brown Bros., Comstock Bridge, Conn.—One 24-inch horizontal "Cylinder Gate" Victor Turbine.

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Thomson & Hoag, Rutland, Vt.—One pair of 12-inch horizontal "Cylinder Gate" Victor Turbines.

Spalding Bros., Townsend Harbor, Me.—One 39-inch upright right-hand "Cylinder Gate" Victor Turbine.

The Union Drawn Steel Co., Beaver Falls, Pa.—Two upright 36-inch "Cylinder Gate" Victor Turbines.

Northern Pacific Coal Co., Roslyn, Wash.—One 30-inch upright "Cylinder Gate" Victor Turbine.

Ogdensburg Water Works, Ogdensburg, N. Y.—Two 48-inch upright "Cylinder Gate" Victor Turbines.

Soulanges Canal, Canadian Government, Coteau Landing, P. Q., Canada.—Four pairs of 24-inch "Cylinder Gate" Victor Turbines.

Carver Cotton Gin Co., East Bridgewater, Mass.—One 36-inch upright "Cylinder Gate" Victor Turbine.

Hadlyme Mfg. Co., Hadlyme, Conn.—One 18-inch upright "Cylinder Gate" Victor Turbine.

New Haven Copper Co., Seymour, Conn.—One 42-inch upright "Cylinder Gate" Victor Turbine.

Beacon Falls Mill and Power Co., Beacon Falls, Conn.—One pair of 27-inch improved horizontal "Cylinder Gate" Victor Turbines, as per Figure 60.

Town of Idaho Falls, Idaho.—One 27-inch horizontal "Cylinder Gate" Victor Turbine.

J. & G. Griffin, Shelton, Conn.—One 24-inch upright "Cylinder Gate" Victor Turbine.

Lewis Anderson, Maypen, Jamaica, West Indies.—One 12-inch improved "Cylinder Gate" Victor Turbine.

M. L. Getchell & Co., Monmouth, Maine.—One 18-inch upright "Cylinder Gate" Victor Turbine.

Hubard Machine Works, Lynchburg, Va.—One 15-inch upright "Register Gate" Victor Turbine.

S. Austin Bicking, East Downington, Pa.—One 30-inch upright "Register Gate" Victor Turbine.

J. S. Twining, Copenhagen, N. Y.—One 15-inch upright "Register Gate" Victor Turbine.

D. H. Snavely, Lititz, Pa.—One 27-inch improved "Cylinder Gate" Victor Turbine.

Davis & Brussels, 12 West 29th St., New York, N. Y.—One single 15-inch horizontal Victor Turbine, as per Figure 16.

J. H. Steiner, Cloverdale, Indiana.—One 15-inch upright "Cylinder Gate" Victor Turbine.

Arthur G. Krug, Sao Paulo, Brazil, S. A.—One pair of 15-inch "Cylinder Gate" Victor Turbines.

H. J. Heiser, Shadle, Pa.—One 32½-inch upright "Register Gate" Victor Turbine.

J. H. Winn & Sons, Winchester, Mass.—One 15-inch upright "Register Gate" Victor Turbine.

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Crown Mountain Gold Mining and Milling Co., Dahlonega, Ga.—One 24-inch special "Cylinder Gate" Victor Turbine, horizontal shaft.

Lozier Engine Co., Plattsburg, N. Y.—Two pairs of 33-inch "Cylinder Gate" Victor Turbines on horizontal shaft.

Massachusetts Chemical Co., Boston, Mass.—One 30-inch and one 33-inch upright "Cylinder Gate" Victor Turbine.

A. & S. Blumenthal Co., Shelton, Conn.—One 21-inch Victor Turbine on horizontal shaft.

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